THE
PLANT LICE OR APHIDIDAE
OF
GREAT BRITAIN

BY

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ERRATA.

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p. 228, line 16, *for* BB read AA.
p. 240, line 7, *for* hippophæ *read* hippophæs.
p. 245, fig. 132, *for* A of E *read* A to E.
p. 273, line 5, *for* Phoroelon *read* Phorodon.
p. 290, line 18, *for* diverging *read* converging.
p. 349, for MYZUS GEI Theobald *read* MYZUS NEOGEI nov. nom. and same fig. 186.
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PREFACE

Since Buckton issued his Monograph of British Aphides in four volumes in the Ray Society Publications from 1875 to 1884, nothing has appeared on this subject in Britain, except a few casual records in local faunas, a few newly described species and some scattered articles dealing with potential insect pests. During the past twenty-six years I have been purposely collecting Aphides in the British Isles and for some years before had been casually collecting them. I had mainly to rely on Buckton's four volumes and so named any found after him. Many had to remain unnamed. Some discrepancies occurred on consulting the original descriptions and so many species have since been found new to these islands and also many new to science that I have decided to publish a collective Monograph dealing with all those species so far found or received by myself in Great Britain. Original descriptions are also appended of all those species which I have not seen and which appear to be good species. Some of Walker's species are probably quite good, but as some of his types have been lost or even perhaps never preserved, only those which seem to me to be recognisable without the types are reproduced here.

The species recorded in this book are of course by no means final, in fact I should be very surprised if some hundred or more new species are not recorded, when a more minute survey is made of the Aphid life of our wild plants. The writer can picture many as yet unrecorded Aphides on local plants in such ideal Aphid land as along the Welsh streams, on the varied flora for instance, around Beddgelert and amongst the Bog Plants on Dartmoor. Of the subterranean forms we know very little, except of a few that do actual damage and some few collected in ants' nests. On the other hand it is quite likely that not a few new and old species will have to sink as synonyms.

The *Phylloxeridæ*, including the genera *Phylloxera* and what is generally known as *Chermes* in the broad sense, is here looked upon as separate from the true *Aphididæ* and is not dealt with.

The writer has not entered into the details of the various classifications that have been adopted by some Continental Aphidologists, or of those proposed by the many excellent workers in America and Japan. The classification employed in this book is based upon that recently put forward by Baker in America, as it appears to be the simplest and most rational. As will be seen a great number of genera have been sunk as synonyms. At the present time it appears that the classification of this important family, economically, is in such a nebulous state that even generic characters seem difficult to fix. Even when they are marked as in *Macrosiphum*, *Myzus* and *Phorodon*, one comes across species that merge from one genus into another. When one looks at the synonymy of many common species, one is at once appalled by the fact that the same insect has been placed by different entomologists under no less, in one case, than six different genera. We see this in the common Willow Aphid *Cavariella capreæ* of Del Guercio, the *Cinara capreæ* of Mosley, the *Rhopalosiphum capreæ* of Koch, the *Hyadaphis capreæ* of Kirkaldy, the old *Aphis capreæ* of Fabricius. Recently a very large number of new genera have been formed by many workers in Europe, America and Japan, etc. Some few of these are marked and may definitely be retained, but many seem based upon such slight characters that they may be looked upon more as specific than generic. Such genera have not been accepted in this book.

Amongst the many new genera created in Europe must be mentioned those proposed by that great aphidologist Mordwilko, in his most admirable work on the Macrosiphini ; by Van der Goot in Holland, and Del Guercio in Italy. Many other genera have been proposed by Matsumura and others in Japan ; others in America, etc. Many of these will appear as synonyms. It is strange that this family of insects has received so little attention until recently, for its economic importance is very great. The vast amount of loss caused by Plant Lice to fruits, corn, roots, vegetables, cotton, coffee, tea, cocoa, hops, and many ornamental plants and trees is only too well-known. Very little is known of the bionomics of many potential pests alone, less still of the very large number of species found on wild plants, bushes and trees ; some of these are probably the same species that attack our food and cultivated ornamental plants. The life-cycle of these hemipterous insects is often extremely difficult to follow owing to the fact that many species, probably most, pass their life upon two or more different kinds of plants, often belonging to quite different orders. Some species even spend the greater part of their life underground, as we see in the case of *Anœcia corni*, which occurs only for a short time on the foliage of *Cornus sanguinea*, the major part of its life being passed in the soil, feeding on the roots of plants and undoubtedly fostered by ants. Other Aphides, such as the quaint *Rhopalosiphoninus calthæ* (Koch) found on *Caltha palustris* occurs every few years for a few weeks and then suddenly disappears. Even with such a marked creature as this we have no idea where it flies to, to pass its existence in the meanwhile. What we do know of the life histories will be given and also the distribution. Many species are almost world-wide in range. Species such as the Cabbage Aphid (*Brevicoryne brassicæ*); the Cotton and Melon Aphid (*Aphis gossypii*); the Cherry Black Fly (*Myzus cerasi*) and many others are common to Europe, Asia, Africa, America and Australasia. Many kinds now being found in Africa are common to Europe and America, and such a very marked species as *Therioaphis ononidis*, the Yellow Clover Aphid, occurs under different specific names in India and America and is also common in Egypt and has recently been found on clover in England. At present very little is known of the African Aphididæ and little of those of South America, a few recently having been recorded and described from the latter country by Blanchard. The only three I have received from South America were common European species. Blanchard lists fourteen species of *Macrosiphina*, ten of which are European or cosmopolitan. (*Physis*, Buenos Aires, XX, 1922). The Asiatic species are known very little of, save from Japan where Matsumura, Okajima and others have described a large number of species. I have received a good many from India and some have been described by Das and Van der Goot and some also from the Malay Peninsula. Those I have received from the West Indies are mostly cosmopolitan insects, but many new species undoubtedly occur there. I am told that in Australasia, Aphides are scarce, except the common crop pests. From the North Arctic Regions, I have received one specimen, an immature *Pterocomma* from dwarf Willow.

Unfortunately the literature of this subject is very scattered, some papers being almost impossible to obtain. The difficulty of the student in obtaining the literature is added to by the fact that much of the valuable work done, such as by Mordwilko, is written in a language that few can read. In the past, as far as Europe and America are concerned, there has evidently been much confusion of species, and this for the simple reason that no definite structural characters were given in the older descriptions. Colour, general shape, relative lengths of the various parts do not invariably hold good. Hence we find, for example, that the Common Green Pea Aphid (*Macrosiphum pisi* Kaltenbach) has been described under another name (*M. destructor*) in America. Had some real structural characters been given and figured this would have been avoided. Still more there has been in the past a lack of opportunity of obtaining descriptions in many scarce books and pamphlets, to which also must be added the invalid descriptions of some of the older authors. As an example of the confusion that has arisen from these causes may be mentioned the common Tea, Coffee and Cacao Aphid. This was described as the species *theaecola* by Buckton from Tea in Ceylon and placed in a new genus *Ceylonia ;* Schouteden described the same insect from Africa as *Toxoptera theobromæ* from Cacao, both are the *Aphis coffeæ* of Nietner—a true *Toxoptera.*

The same applies to the sinking of species as synonyms, judging from general colour, relative lengths of various parts, etc. We have seen in Europe, Aphidologists sinking the *Spiræa* Aphid, formerly called *Macrosiphum ulmariæ* (Schrank) and the *M. gei* of Koch as synonyms of *M. pisi* Kaltenbach ; yet an examination of the structure of the antennæ and the cornicles at once enables us to see that the two are distinct, and have only a superficial resemblance. The *ulmariæ* of Schrank is not a *Macrosiphum* at all, but is a true *Aphis*. The Spiræa Macrosiphum the *M. cholodkovskyi* of Mordwilko is Koch's *gei*. In most of the species I have seen I have endeavoured to give figures of the structural peculiarities of the cornicles, antennæ and cauda.

It is impossible to thank all the numerous correspondents who have sent me specimens and who have helped me in many ways, but I must mention the kind help given me by Professor Davis, Dr. Wilson, Dr. Baker, Professor Gillette, Professor Essig and Miss Patch in America ; Dr. Mordwilko of Petrograd ;

Dr. Schouteden of Brussels and Drs. Matsumura and Okajima of Japan. Mr. F. Laing, of the British Museum, has also been most kind in many ways, and has been good enough to look over the proofs and has incorporated many valuable notes.

A large number of Walker's species described in the Zoologist for 1849-51, in the Annals and Magazine, etc., I have been unable to identify. A good many are the same species described again and again as different species. Some of the types have apparently been lost ; a good many are in the British Museum with Buckton's types. Several of Walker's species which have been found have been redescribed by Mr. Laing and myself, and those that seem to be good species, that I have not seen, are incorporated in this work under Walker's too short, original description.

The types of new species described here and all those I have previously described are in my collection, which will eventually be transferred to the National Collection.

FRED. V. THEOBALD.

Wye Court, Wye.
28th March, 1926.

INTRODUCTION.

A volume could be written on general matters concerning the Plant Lice or Aphididæ, their many strange ways of living, their very curious, erratic or regular migrations; the vast swarms that may appear, causing what are popularly called "Blights"; their great and rapid rate of increase under certain conditions; their internal anatomy and the production of the sweet fluid, so-called "Honey Dew," which causes so much harm to the plants it falls upon.

It is not intended in this book to deal with all these matters which may be left for a separate volume. The systematic aspect of the *Aphididæ* alone will be dealt with, except that what is known of the Life-cycle of any species will be included along with its technical description.

All we need deal with here is the structure of the exoskeleton as far as it is essential for diagnostic purposes and the system of classification which it is intended to follow; the reader being referred to other works dealing with the various classifications that have been put forward.

External Structure of an Aphid.

Three forms of females occur in the majority of Aphides, (1) an alate viviparous female, (2) an apterous viviparous female and (3) an apterous oviparous female. The males may be either winged or wingless.

The apterous viviparous females are really of two kinds, (1) the Fundatrix or "Stem Mother" and (2) the progeny or "virgogenia."

The Apterous viviparous female. (Fig. 1). The body is soft; the skin more or less provided with glands that secrete either a waxy or mealy matter (*Hyalopterus pruni*), white flocculent wool (*Eriosoma lanigerum*) or a skin resembling a Coccid Scale (*Cerataphis lataniæ*). The form is generally oval or globose, sometimes flattened below, rarely linear. The body is more or less prominently divided into segments, which vary apparently in number; some of the segments may be hidden.

The head is more or less distinct; in some it is markedly separated from the thorax, in others less so. The head carries the rostrum (Fig. 1, la); the antennæ (ant); two compound eyes (e); and the region known as the face and vertex or crown. The vertex may bear two more or less prominent processes, the frontal tubercles, arising from it, near the upper margin of the compound eyes and also a median process. The eyes are large in most aerial species and vary from red to brown and almost black; the facets are more or less hemispherical, each eye having usually a supplementary eye or tubercle attached to it, which is also provided with two or more hemispherical facets. Ocelli do not seem to occur in the apteræ. In some subterranean species the eyes are very minute. The antennæ vary to some considerable extent. They may be very short in the apteræ and composed of four segments (*Hamamelistes*) or very long and of six segments (*Macrosiphum*) or moderately long and composed of five segments (*Essigella*). The first two segments are usually much the smallest, i. being more or less wider than ii.; vi. is made up of two distinct parts, namely a widened basal area and a more or less elongated portion, the "Flagellum." The two latter have been looked upon as two

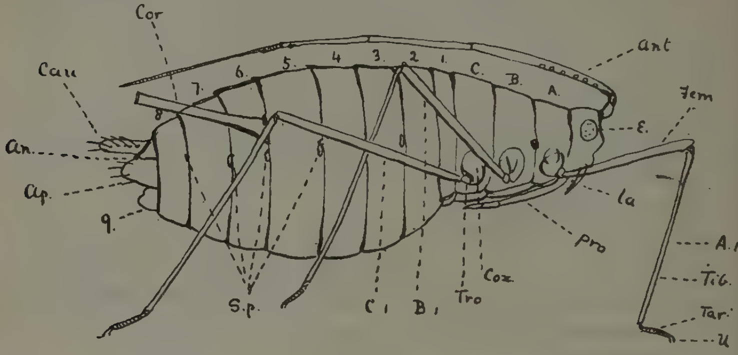

Fig. 1.—*Structure of Apterous viviparous* ♀.

e. Eye; Ant. Antenna; A. B. C. Thoracic segments; 1-8. Abdominal segments; la. labium; pro. proboscis; Cau. Cauda; An. Anal plate; Ap. Apical segment; 9. Ninth segment; s.p. spiracles; Cox. Coxa; Tro. Trochanter; Fem. Femur; Tib. Tibia, etc.

distinct segments, hence Buckton and others speak of the antennæ of *Macrosiphum*, *Aphis*, etc., as being composed of seven joints. I can find no trace of a joint between the flagellum and the basal area and there is little doubt that they represent but a single segment. Segment iii. is usually rather long, often longer than iv. and v. and sometimes as long as or longer than vi.; it may carry a few sensoria, but never to the same extent as in the alate female; there is also a single or primary sub-apical sensorium on segment v. and a group at the apex of the basal area of vi. These structures are often called "*rhinaria*"; they vary in size and shape; some are circular, some oval, others annulate; vi. has one large rhinarium and a group of small ones around it. Some or all but the first two segments may show marked imbrication, and all carry a few or many hairs. The "Rostrum" or proboscis (Fig. 1, pro) is an extension of the body, which forms a sheath or channel, open above, in which lie the four thread-like setæ, one pair of which unite, so that only three appear; these are the mandibles and maxillæ (Fig. 2). The

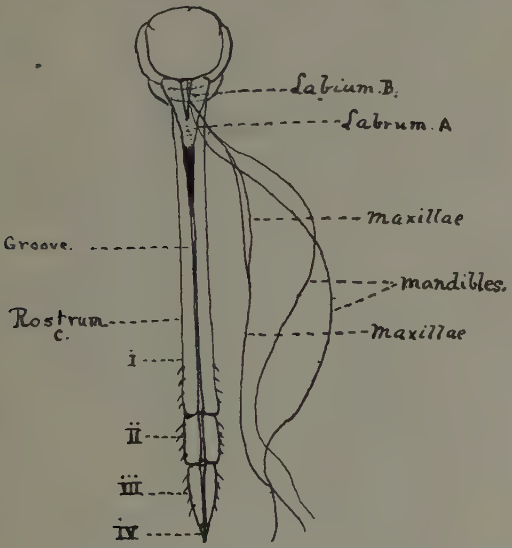

Fig. 2.—*Rostrum or Proboscis.*

Showing small Labrum above, the setæ and smaller Labium and the grooved beak, a prolongation of the body, in which lie the setæ.

rostrum is of three segments, the first longest, the second more dilated and short; the third acuminate and short and thick as in *Aphis* or long and thin as in *Dilachnus;* the apex (iv.) is usually dark and horny and provided with fine hairs. The setose mandibles and maxillæ vary in length. The labium (Figs. 2 and 3, Lab.) is well developed in some genera such as *Lachnus* and *Stomaphis* but in many others it is very small (*Macrosiphum, Aphis,* etc.) (Fig. 2, Lab.); it is falciform in shape and partially covers the groove of the rostrum and protects the setose mandibles and maxillæ (se). The labrum is usually more developed than the labium. The relative length of the rostrum is very variable, not only in different genera and in different species of any particular genus, but also in the same species. For instance in some *Lachnini* it varies from one-half to two-thirds the length of the body in the adult apterous female; yet in the young it may be

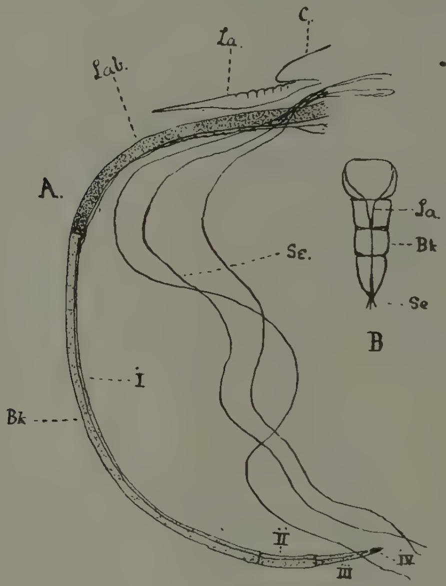

Fig. 3.

A. Proboscis of Stomaphis. B. Proboscis of Geoica. C. Clypeus. La. Labrum. Lab. Labium. Bk. Beak or Proboscis; I-III. Segments of Bk. Se. Setæ (mandibles and maxillæ) the later fused.

twice as long as the body. In some subterranean species (*Geoica carnosa*, etc.) it is very short and thick (Fig. 3, B), and in many species of *Aphis* it only reaches to the second coxæ, whilst in the large *Stomaphis quercus* which seeks the sap in the alburnum of the trunk of the oaks, it is nearly twice as long as the body and the setæ are very much longer (Fig. 3, A). In the majority of Aphides the rostrum is carried under the thorax, tightly folded

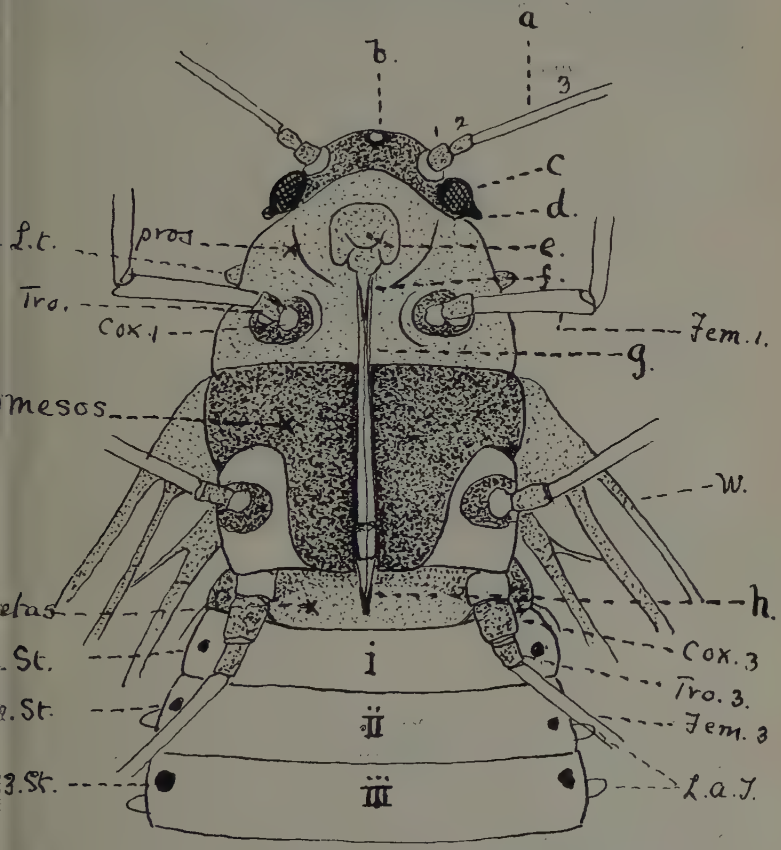

Fig. 4.—*Ventral View of Thorax and Head* (after Mordwilko).
a. Antennæ; b. median stemmata; c. compound eye; d. eyelet; e. clypeus; f. labrum; g. rostrum; h. labellæ; pros. prosternum; mesos. mesosternum; metas, metasternum; Cox. Coxæ; Tro. Trochanters; Fem. Femur; I, II, III, first three abdominal segments; 1-3 St. stigmata; L.t. Lateral tubercle; L.A.T. Lateral abdominal tubercles.

against it or lying in a groove (Fig, 4, g); but in one genus, *Rectinasus* Theob.* it is carried at an angle to the body and in most at right angles. The rostrum was formerly looked upon as the labium, but it is really an extension of the body. The *thorax* is composed of the normal number of segments, which may or may not be well defined; usually the pronotum (Fig. 5, pro) is more clearly marked off than the meso- and meta-notum (mes, met); it may also bear a blunt lateral papilla (Fig. 4, L.t.) and is more or less closely articulated to the head by a membrane which, however, is not as defined as in the alate female; the meso- and meta-notum are not so marked; in some the latter is scarcely noticeable; in others the mesonotum is very distinct. The prosternum (Fig. 4, pros.) carries the fulcra to which the anterior legs are articulated (cox. 1); the mesosternum (mesos) carries the fulcra of the second pair of legs and is also to some extent grooved to receive the rostrum; the meta-sternum (metas) carries the fulcra of the 3rd pair of legs (cox, 3), but is not so marked.

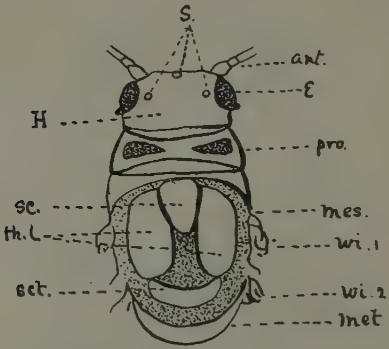

Fig. 5.—*Head and thoracic region of an Aphid* (dorsal view). s. stemmata; ant. antennæ; e. compound eyes; H. head; pro. pronotum; sc. scutum; mes. mesothorax; th.l. thoracic lobes; wi. 1. mesothoracic wing; wi. 2. meta-thoracic wing; sct. scutellum; met. metanotum (after Hayhurst).

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* This peculiar genus I described from Africa. It was sunk by Baker under *Forda*. There is no connection. Mordwilko has raised it to a Sub-Family.

The *abdomen* is composed of more or less distinct somites, which when the body is replete with food often almost disappear, but as the food is absorbed they become more prominent and a lateral groove or "*carina*" may appear. This carina is caused by the folds of the connexivum becoming puckered, as the insect shrinks from the want of food; in some it is always present, except in a very gorged state. The normal number of true segments is eight or nine, but if the anal plate and cauda are to be included, then it is ten or eleven. The segmentation is sometimes quite obliterated above (*Forda*, etc.) but remains distinct ventrally; then eight segments are noticed, exclusive of the genito-anal area.

The *spiracles* (Fig. 4, st) are situated at the sides below the connexivum, which unites the dorsal and ventral areas of the body. They are normally ten in number and are very simple, apparently without any transverse fringes, but distended by a chitinous ring; each segment, with the exception of the head, appears to have one pair.

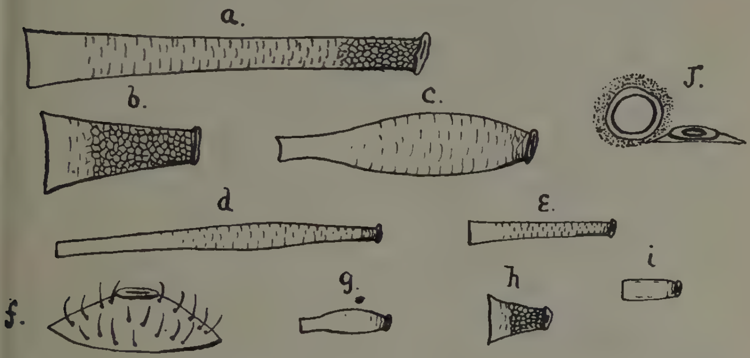


Fig. 6.—*Types of Cornicles.*

a. *Macrosiphum*; b. *Macrosiphoniella*; c. *Rhopalosiphoninus*; d. *Myzus*; e. *Aphis*; f. *Lachnus*; g. *Rhopalosiphum*; h. *Chaitophorus*; i. *Hyalopterus*; j. *Eriosoma.*

The *Cornicles* (Fig. 6) or "nectaries" are placed on the dorsum of the sixth abdominal segment towards the sides. They are also spoken of as the "Honey-tubes" or "Siphuncles." They vary very much in size, form and ornamentation. In *Macrosiphum* (Fig. 6, a) they are long and cylindrical, often as long as half the length of the body; in Del Guercio's *Macrosiphoniella* (Fig. 6, b) they are thick, and moderately long, expanding widely at the base; in *Rhopalosiphoninus* (Fig. 6, c) they are widely clavate or vasiform and rather long; in *Myzus* (d) they are long, thin and cylindrical, now and then slightly swollen; in *Aphis* (e) cylindrical and straight; in *Hyalopterus* (i) short yet distinct, and in the *Lachnids* (f) they occur as blunt cone-shaped bodies, often only just projecting above the surface of the body; in *Forda*, *Geoica*, *Eriosomatinæ*, etc., they are practically level with the integument (j) in fact we may say except as "pores" that they are really wanting. The apex of the cornicles is usually flat, but in the genus *Jacksonia* it is sloping. The sculpturing on the cornicles varies to some extent; two main forms of ornamentation occur in the apteræ—(i.) imbrication all over the tube, and (ii.) reticulation at the apex, which may spread down nearly to the base. The cornicles are the terminations of excretory ducts and pass out clear drops of a fluid, but not the copious quantity of so-called "Honey-dew" that the Aphides have the power of expelling and which is ejected per anum. The *Cauda* (Fig. 7, c) varies much in size in the various genera; it may be very small as in *Pemphigus* and *Eriosoma* and *Geoica* or very long as in *Macrosiphum*. In shape it may be ensiform, clavate or triangular, rounded or acuminate. It seems to be exserted from the ninth abdominal segment, above

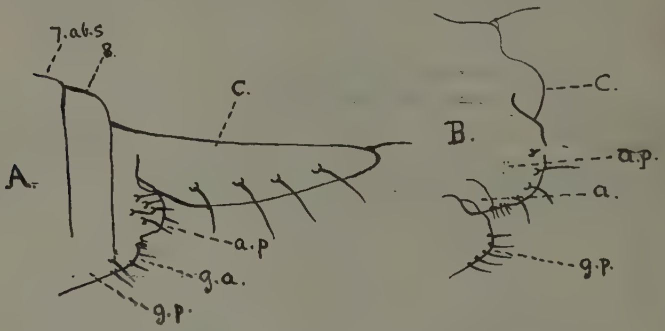


Fig. 7.—*Organs of eighth and ninth segments.*
A. Macrosiphum; B. Pemphigus. 7.ab.s. 7th abdominal segment; 8. eighth; c. cauda; a.p. anal plate; g.p. genital plate; g.a. genital armature; a. anus. (After Vickery.)

the anal plate ; its surface is spinose, as are also its edges, and it is provided with two or more pairs of lateral hairs and others on its upper surface. It only assumes its typical form in the fully matured apteræ and alatæ ; in the immature form it is always smaller and usually bluntly triangulate. Below the anal plate are two dark coloured valves, which close the vulva (the *after lappchen*).

The alate viviparous female (Fig. 8). In the alate viviparous female, the head, thorax and abdomen are much more markedly separate. The head (h) is very similar in form to the apterous female, but bears in addition to the compound eyes, three stemmata or ocelli (h. 1). The antennæ (a) are very similar in the general form, but segment iii. has a greater number of round

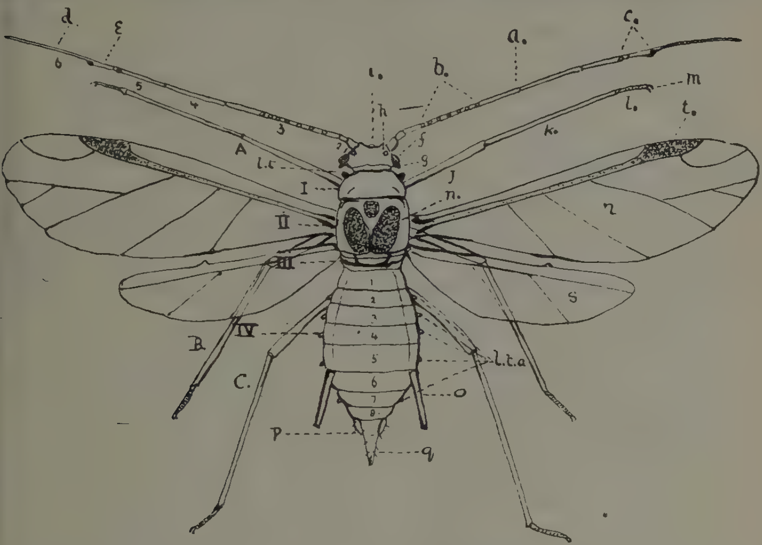


Fig. 8.—Structure of an Alate Aphid.

h, head ; f, compound eye ; i, median stemmata ; h, lateral stemmata ; g, ocular process ; l.t, lateral tubercle ; a, antennæ, 1-6, segments of antennæ ; e, basal area of sixth antennal segment ; d, flagellum ; b, sensoria (secondary) ; c, primary sensoria ; i, ii, iii, Pro-, meso- and meta-thorax ; A, Prothoracic legs ; B, Meso-thoracic and C, Metathoracic legs ; j, femur ; k, tibia ; l, tarsus ; m, ungues ; r, Mesothoracic wings ; s, Metathoracic wings ; t, stigma ; u, thoracic lobes ; iv, 1-8, abdominal segments ; l.t.a, lateral abdominal tubercles ; o, cornicles ; p, anal plate ; q, cauda.

or oval sensoria (b)—as seen in *Macrosiphum, Myzus, Aphis*, etc., or has transversely elongate sensoria—*Callipterini*, etc., or annulations—*Eriosomatini* and *Pemphigini*. Moreover in many, segment iv. and in some v. may have round sensoria or annulations. The pro-thorax (i.) is markedly separate from the head (h) and meso-thorax (ii).; it is articulated to the head by a dense membrane usually showing a pale line; the pronotum (i.) is narrow as a rule (the *Phylloxeridæ* or at any rate *Chermesidæ* being treated here as a separate family). The meso-notum (ii.) is large and has three marked coriaceous lobes (n)—the so-called "thoracic lobes." The two large lobes—the lateral lobes—support the muscles of the anterior wings (Fig. 5, Th.l); the third lobe is placed between them, in front in a wedge-shaped manner; this is the *scutum* or *præ-scutum* (Fig. 5, sc). Posterior to the lateral lobes is another single coriaceous plate, the *true scutum* or *scutellum*, usually triangular in shape (Fig. 5, sct). The meta-notum and meta-sternum are small. The wings are four in number, the anterior pair (r) being much the larger. All four are membranous and are usually quite transparent (*Macrosiphum, Aphis, Myzus, Eriosoma*, etc.), or they may be ornamented

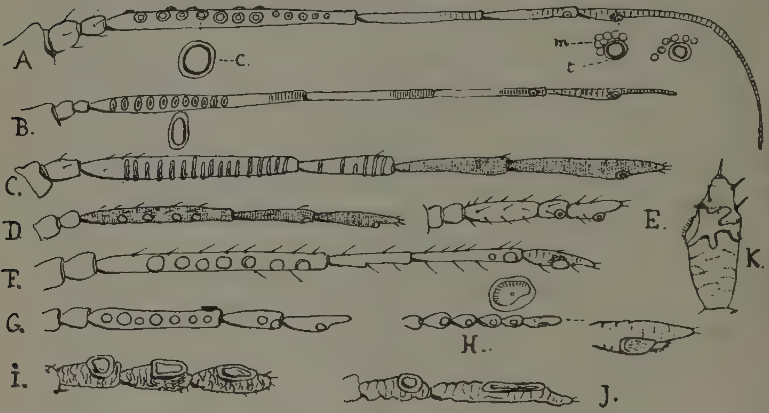


Fig. 9.—*Variations in Antennæ* (Alate ♀♀).
A. Macrosiphum; B. Callipterus; C. Thecabius; D. Vacuna; E. Geoica (Apt. ♀); F. Lachnus; G. Geoica; H. Rhizobius; I. Adelges; J. Phylloxera; K. Tetraneura (apical segment).

(*Idiopterus*, *Pentalonia*, etc.). The wings are attached to the meso- and meta-notum by slight swellings—the wing "insertions"—which are often of brighter hue than the rest of the body. The narrow second pair of wings (s) are attached to the front pair by a hooked appendage (Fig. 10, Hooklets) on their outer border, which fixes into a strong thickening on the inner border of the front pair. The venation (Fig. 10) is to some extent a very doubtful character, but in its widest sense can be used to form certain well defined groups, in conjunction with the structure of the cauda and cornicles and the form and structure of the antennæ. The

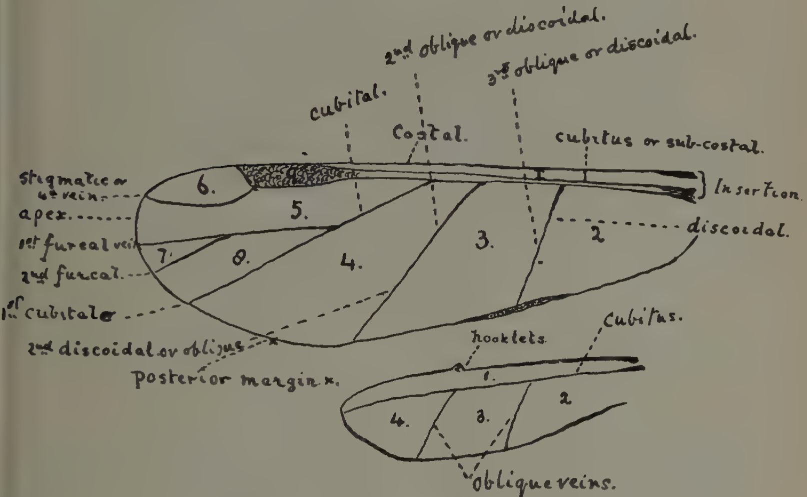


Fig. 10.—*Aphid venation.*

1. Costal cell; 2. basal cell; 3. first discoidal cell; 4. second discoidal cell; 5. inframarginal cell; 6. marginal cell; 7. second cubital cell; 8. first cubital cell; 9. Stigma.

typical venation consists of a prominent cubitus, or so-called post- or sub-costal vein, which expands into the stigma (Fig. 10, 9), at its apex; the stigma (9) is usually clouded or coloured and is strongly imbricated. From near its apex arises the curved stigmatic vein, or fourth vein; there are three oblique veins, arising from the cubitus; the one nearest the stigma is the cubital and this may be simple or once or twice forked, a very characteristic feature, but one which is liable to great variation in certain species; the other two are known as the second and third oblique veins or discoidals. The hind wing has a simple cubitus with one or two oblique veins. In the *Eriosomatinæ*, etc., the venation of the hind wings is very marked and characteristic of well defined genera. The cells are shown in the diagram

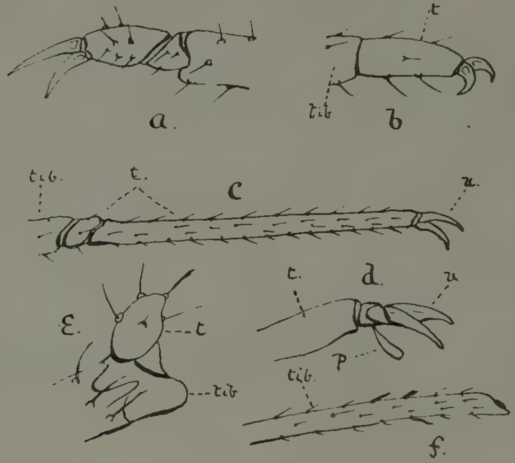


Fig. 11.—*Different forms of tarsi.*

a. Geoica sp.; b. Tetraneura ulmifoliæ; C. Protrama radicis; d. Drepanosiphum platanoides; e. Hamamelistes betulæ; f. Atarsos; p. pulvillus.

(Fig. 10). The marked abnormalities so often seen in the cubital in various genera, may also be frequently seen in not only the same species, but in the same specimen. Typical *Toxoptera* venation may often be seen on one side, *Aphis* venation on the

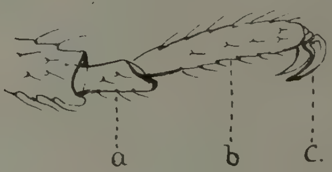


Fig. 12.—*Tarsal Segments.*

a. First tarsal; b. second tarsal; c. ungues.

other. Many terms are used for the venation. It is not possible or necessary to enter into these here. The position of the wings when the insect is at rest is also somewhat varied; many fold them in a tectiform manner ; a few fold them as in the diurnal Lepidoptera and in some (*Vacuna*) they are folded horizontally, overlapping one another.

The legs vary only in relative length, except in a few instances. The tarsi (Fig. 12) are normally of two segments, the basal one being small, uniting the large distal segment to the tibia by means of an elastic membrane, but in some genera (Fig. 11, b) (*Tetraneura*, etc.) this basal segment is absent. The ungues are paired and there may be a distinct pulvillus (*Drepanosiphum*) (11, d). Other marked modifications of the legs are seen in the genera *Trama* (11, c), *Saltusaphis*, *Hamamelistes*, and *Atarsos* (11, e and f).

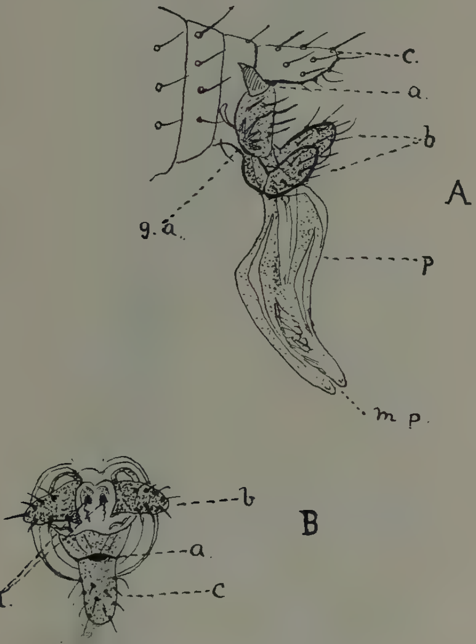


Fig. 13.—*Male Genitalia.*

A. lateral ; B. frontal view. C. cauda ; b. opercula ; a. anus ; p. extruded penis ; m.p. meatus penis ; g.a. genital armature ; d. muciparous glands.

The oviparous female. The sexually mature female is normally apterous. The oviparous female is usually much smaller and rounder than the viviparous female, but may be elongated with a projecting blunt ovipositor, as is seen in *Drepanosiphum.* The antennæ and legs are usually stouter and shorter than in the other forms, and the hind tibiæ are flattened and expanded and usually bear numbers of sensoria. The mouth may or may not be fully developed. Ocelli seem to be absent. These oviparous females are as a rule very sedentary, but those on Roses, such as *Capitophorus rosarum* Kaltenbach, are quite active in habits.

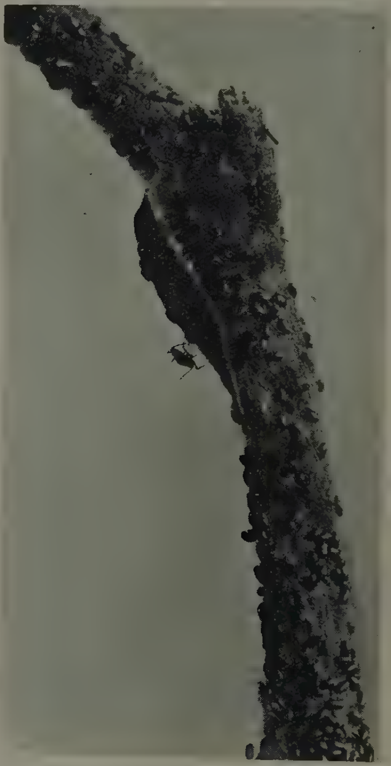


Fig. 14.—Ova of Apple Aphis (*Aphis pomi*) and newly hatched young.

The male. The males may be alate or apterous, they are usually the former. Most are very small, the abdomen particularly so; the thorax is fully developed. The antennæ are long and have sensoria on segment iii. and some also on iv. and v. The compound eyes are normal and there are three stemmata. The wings are usually large, especially the front pair, and have the same venation as the alate females. The legs are normal. The genitalia (Fig. 13) are marked; the penis (Fig. 13, A, p) is long and usually curved or elbowed and is extensile; beneath it are two prominent cone-shaped claspers or opercula (b). Some species such as *Macrosiphum pisi* have both alate and apterous forms of males.

The ova. (Fig. 14.) The sexual reproduction, accompanied by the deposition of eggs or ova, usually takes place during the autumn and late autumn (*Aphis, Myzus, Phorodon, Lachnus,* etc.). The eggs are mostly elongate-oval in form, more or less rounded at each end. When first laid they are green or yellow and are coated with a gummy secretion. Later they darken in colour; the majority turn shiny black, but some remain a deep brown. They may be deposited singly (*Rhopalosiphum prunifoliæ, Phorodon inulæ,* etc.), or in dense masses (*Aphis pomi, Pterochlorus roboris,* etc.).

The majority are laid on the shoots, or bases of the buds, where they remain during the winter. Others may be deposited on the foliage and may fall with it to the ground (*Phyllaphis fagi*).

Not only are Aphid eggs laid on the wood, buds and leaves of trees, but many oviposit on various herbs and low plants, both on the seed-heads (*Hyalopterus atriplicis*) and on leaves (*P. inulæ*). Some place their eggs on the stems of perennials (*Aphis rumicis*) as well as on woody shrubs, such as *Euonymus*. Ova are also laid on tubers as we see in *Myzus persicæ* of Sulzer and *Macrosiphum gei* Koch. Others are deposited actually on the roots of plants, such as Plantains (*Plantago spp*), and on grasses (*Graminaceæ*) as seen in *Aphis plantaginis* of Schrank. Some of the subterranean ova are tended by ants, who carry them to their formicaries and tend them. Many Aphid ova laid are infertile; these have a shrunken shell. In cases of winter spraying with caustic washes, these shrunken eggs have been *supposed* to have been damaged by the wash.

GENERAL CHARACTERS OF APHIDIDÆ

(Given by Oestlund and others.)

Three types of head are acknowledged:

First, the transverse (generalised), in which the head is broader than long, the distance between the antennæ is wide and the frontal margin straight (=*Lachnina*).

Second, the subquadrate (Aphidian), in which the head is narrowed anteriorly and produced as a pair of frontal tubercles on which the antennæ are situated; the frontal margin is concave and emarginated.

Third, the reduced (Pemphigian) correlated with the reduction of antennæ and eyes. Frontal margin usually convex.

Three types of eyes occur at the same time in the alatae:

(i.) The larval eyes which persist throughout life = *ocular tubercles.*
(ii.) The compound eye, to which are attached
(iii.) The dorsal ocelli.

Antennæ:

(*a*) The first two segments, short and broad and usually devoid of sense structures.

(*b*) The following segments, more slender and often called the *flagellum*, with special sense structures, the *sensilla* and *sensoria.*

The terminal segment has a primary sensorium and several secondary ones and the prolongation beyond the sensorium as a fine filament called the "spur" or "flagellum."

The sub-terminal segment also has one primary sensorium near its apex.

Sensilla or sense hairs on the antennæ are as follows:

First, long, slender hair-like sensilla of the flagellum as in Lachnina and related tribes.

Second, short and spine-like sensilla of the Aphidini.

Third, the glandular sensilla with enlarged apices of the Macrosiphini.

Fourth, the apical sensilla of the spur.

Sensoria. Many types:

First, the imbrications or transverse folds of the flagellum.

Second, the primary sensoria usually fringed with rows of hairs, as on base of spur, another at apex of sub-terminal segment. The first to appear and go on from larva to adult.

hird, the secondary sensoria which occur on the flagellum in the adult, but may also occur in the larvæ.

The secondary may be circular as the primary, but in the *Pemphiginæ* and forms with shortened antennæ they become crowded and may be transverse or annulated and extend more or less around the segment like a ring.

ourth, the marginal sensoria, a group of five or six small sensoria close to the margin of the primary sensorium of the terminal segment.

Two distinct types of these :

a) Scattered over some area as in the *Lachnini*.

b) or grouped close together in a row or pyramidal form as in the *Aphidina*.

THE NORMAL LIFE-CYCLE OF AN APHID.

The normal life-cycle of a typical Aphid is for it to pass the winter in the egg stage ; but some, such as *Forda*, *Tetraneura* and *Paracletus*, and a few subterranean *Aphis*, may occur as apteræ during the cold months. Now and then even such species as the Rose Aphid (*Macrosiphum rosæ*) and the Green Peach Aphid (*Myzus persicæ*) may occur as apteræ right through the year and the latter even as alatæ, but such is abnormal, for ova are usually deposited. These winter eggs hatch in spring into small larvæ, which grow into mature apterous females—Stem Mothers or Fundatrices. These females soon commence to produce living young asexually, and it is during this period of reproduction that the vast increase of the Aphides commences to take place. The living young so produced—the so-called "Lice"—soon become ready to still further multiply their species, as the "apterous viviparous females or virgogenia." As each may often produce seven or eight young per day, under favourable conditions, and as an individual may go on reproducing for twenty or more days, it can readily be seen that a huge progeny may result. These apterous viviparous females differ somewhat in structure from the earlier "Mother Queens." Sooner or later a winged generation of females (fundatrigenia) arise and these fly off to other plants of the same species or genus or family and start reproducing asexually again as we see in the Green Pea Aphid (*Macrosiphum pisi*) and the Rose Aphid (*Macrosiphum rosæ*).

But more usually they fly to plants of another order. Here these alate females may produce living young, and these start a series of apterous viviparous females, which go on until the autumn and then alatæ (sexuparæ) are generated, "return migrants," which fly back to the winter host and produce a wingless brood of egg-laying or oviparous females, alate males about the same time appearing (sexuales). Such we see in the Hop Aphid (*Phorodon humuli*) which migrates between the Prunes and the Hop. The oviparous females are fertilised by the alate or more rarely apterous male, and the result is that ova are produced.

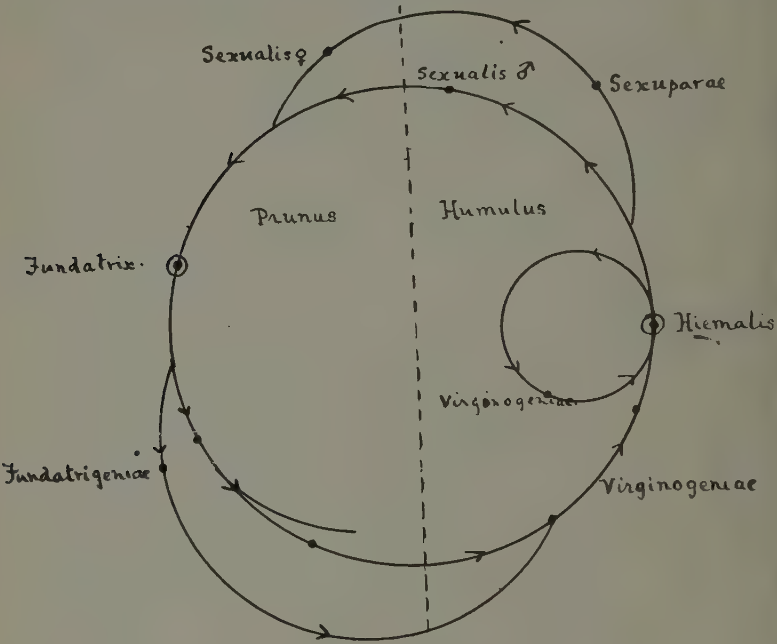
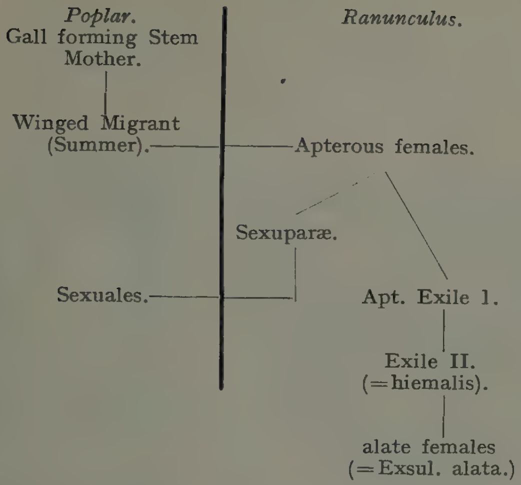


Fig. 15.—Biological Scheme of *Phorodon humuli.*

There are some Aphides in which sexuales must be very rare and in some at present no males or females have been found (*Neomyzaphis abietina* Wlk. and *A. gossypii* Glover, etc.) and in such asexual reproduction can be traced right through the year. One at least, *Aphis saliceti* Kaltenbach, produces sexually in summer. The migrations of Aphides may be regular (annual) or spasmodic. One can tell within a week or so when the Hop Aphid (*Phorodon humuli*) will appear on the hops as winged females (" Fly "), from the Sloes, Bullaces, Damsons and Plums. On the other hand there seems to be no very definite time for the Black Aphis (*Aphis rumicis*) to leave the Spindle Tree (*Euonymus*) or the Docks (*Rumex*) and migrate to the Poppies, Beans, etc. and set up the other asexual colonies there. Constant migrations may take place under favourable conditions during the greater part of the year, such as we observe in the Rose Aphid (*Macrosiphum rosæ*), between rose and rose, teazle or scabious. In many of the *Pemphiginæ* we find a migration between the Poplars and such plants as the Cudweed (*Gnaphalium*) and Lettuce (*Lactuca*) ; gall-formers on the Poplars , root-feeders or leaf-feeders on the secondary host plants ; returning to the Poplar trees to produce sexuales and winter eggs. There are many cases of migration from the ground to plants and trees and *vice versa*, such as we observe in the *Tetraneura ulmifoliæ*, which occurs on the roots of grasses, etc., and as a " gall-former " on the Elms (*Ulmus*). Probably all the subterranean Aphides have an alate brood, which fly to other plants, but alatæ are scarce in many of them. *Anœcia corni* lives most of its life under ground, feeding on the roots of many grasses and other plants, and there may produce an oviparous brood below ground. In the late summer it produces an alate brood which leaves the soil and flies to the Dogwood (*Cornus sanguinea*). Similarly with *Aphis plantaginis* Schrank, we find the viviparous forms on the leaves of Plantain (*Plantago, sp.*) and then they enter the soil and feed on roots and there I have found sexuales and ova. Most of the ground forms are attended and cared for by ants and some appear to be truly myrmecophilous (*Paracletus*, etc.). Other species may ive on the leaves, fruit, trunk, etc. of trees, and also on the roots *Eriosoma lanigerum*). In such cases we may have a regular migration between the ground and the trunk, etc., and *vice versa*, as we find in the case of the Woolly Aphis (*E. lanigerum*). The Woolly Aphid also goes to the Elms and there we find the sexuales and winter eggs produced—the progeny of which fly back to the Apple, Hawthorn, etc. Our common Leaf Curling Elm Aphid *Eriosoma ulmi*) migrates to the *Ribes* and deposits its young on he leaves or on the soil under the bushes and these enter the ground and feed on the roots of the Currants and Gooseberries and become the *Eriosoma fodiens* of Buckton; later an alate brood is produced and these fly back to the Elms, where ova are deposited. Some soil species produce alatæ very rarely (*Trama, Forda, Paracletus*, etc.) and at present we have no idea as to what plants these fly. All these are ant attended species.

Many others are much sought after by ants for their sweet secretions. The part played by ants is of considerable economic importance, for they carry the Aphides from plant to plant and tree to tree, and thus set up new colonies. The writer has particularly noticed this in the case of the very harmful Apple Aphid (*Dentatus roseus* Baker). The close connection of Ants and Aphides is thus not only of interest, but of much practical importance. One way of checking many Aphid attacks is to kill the annoying ants.

PARALLEL SERIES. In some species of Aphides the individuals may assume quite different habits and so give rise to the phenomena known as parallel series. This we see prominently in the *Pemphiginæ*. Cases of "Parallelism" are known in *Thecabius* and *Hamamelistes*. With *Thecabius affinis* the parallelism is very well defined. This species forms galls on the leaves of Poplars and hatches from the ova laid on the Poplars. In the "galls" a second generation is produced and these become alate and fly from the Poplars to *Ranunculus* in the summer, so-called "migrants." Two generations are produced on *Ranunculus* and they go back to the Poplars and produce the sexuales (♂ and ♀), and so ova, from which the "Mother Queen" or "Fundatrix" arises in Spring. Mordwilko has shown that apteræ remain on *Ranunculus* also all the winter; a fact which I have frequently verified. Tullgren (Ark. v. f. Zoolog., V., 14) observed these on *Ranunculus* in early June, the time when the Stem Mother is on *Populus*, and that by the end of June alate females came from *Ranunculus* and flew away, probably to other species of *Ranunculus*, and this corresponds to the "exsules alatæ" of *Chermes*. I have found *affinis* on Buttercups in nearly every month of the year, as apteræ, in Great Britain, and it evidently lives a very long time asexually—a parallel race —on those plants. Rymer Roberts (Mem. Proc. Manchester Lit. and Phil. Soc., lix., 9, 1915) gives the following scheme of this parallelism:



Börner (Abhand. Naturwiss. ver Bremen xxiii, pt. 1, p. 164, 1914) and Rymer Roberts (Mem. Proc. Manchester Lit. and Phil. Soc. lix. No. 9, 1915) also refer to parallel series in *Hamamelistes*. The former shows that in *H. betulæ*, the alate generation (sexuparæ) are the offspring of the first summer generation of the apterous females (æstivalis I.) and makes the æstivalis II. a parallel generation to the sexuparæ. Similarly with the Woolly Aphid of the Apple (*Eriosoma lanigerum*) in which we get a migration of sexuparæ from the Apple to the Elms (*Ulmus*) in autumn, giving rise to sexuales and winter eggs, whilst the "hiemalis" persists on the Apple and the progeny may go on living, generation after generation on the Apple, as apterous parthenogenetic females. In such cases we may expect the insect to persist on the apple or other tree without any fresh infections from the sexual race on the Elms, etc. This "parallelism" is very different from the simple migration as seen in the Plum Aphid (*Anuraphis helichrysi*. Kalt.) which flies to *Myosotis*, Umbelliferæ and many other plants, known amongst other names as *Aphis myosotidis* Koch., to return to the Prunes for its over-wintering egg stage.

Abnormal Growths produced by Aphides.

Many Plant Lice produce abnormal growths on the "host plants." A common deformity is seen in the curling of the

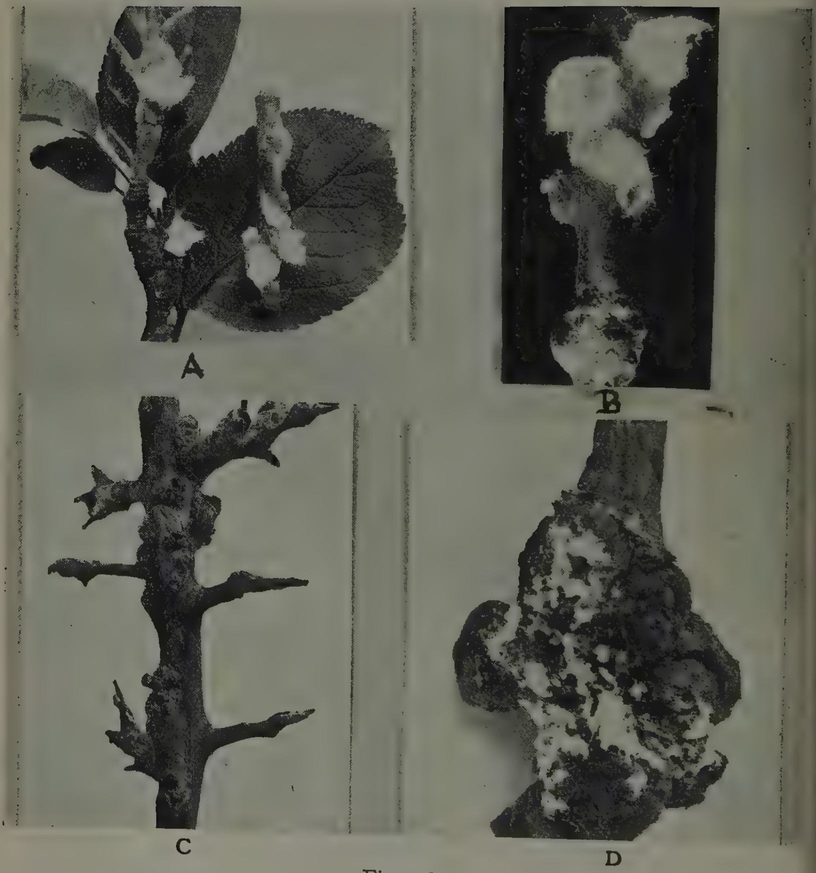


Fig. 16.
Woolly Nests on Shoots A. and B. and galled growths on wood C. and D., produced by the Woolly Aphid (*Eriosoma lanigerum*).

eaves, due to the constant puncturing of the leaf tissues by the nsects. The curled leaves may form dense tufts as seen on the pple, produced by *Dentatus roseus* Baker, and on *Ribes* by *Aphis rossulariæ* Kaltenbach, the swarming apteræ pass on to the hoots, check the growth and cause a stumpy mass of leaves and ontracted stems ; or they may merely curl one up, as is done by *riosoma ulmi* on Elms, or make a large swollen leaf-nest as we see roduced by *Pachypappella reaumuri* on Lime trees (Fig. 18), or ery marked galls such as are found on the mid-rib of *Chenopodium* aused by *Hyalopterus atriplicis* Linnæus. Boil-like swellings pseudo-galls are produced on the wood by the Woolly Aphid *Eriosoma lanigerum*) on Apple and Hawthorn, which swell, rack and eventually produce large, canker-like masses. Fig. 16). Other species make very definite shaped *true* galls n foliage, leaf-ribs and strigs—as the large bladder-like alls of *Eriosoma lanuginosum* on the Elms, or flask-like alls (*Pemphigus bursarius*) (Fig. 19), and the upstanding galls n Elm leaves due to *Tetraneura ulmifoliæ*. Complete defoliation ay be caused as has too often been seen on the Spruces in ngland, Wales, and Ireland, by the Green Spruce Aphid *Neomyzaphis abietina* Wlk.). Other kinds such as *Anuraphis lipæ* Boyer, cause the roots to split and the insects then flourish the soft damaged tissues (Fig. 17). Many other Aphides form ense coatings on the stalks and leaves of plants, yet they seem to roduce no marked abnormal growths, as we see in the Elder phis (*Aphis sambuci* Linn.) and the Black Fly (*Aphis rumicis*). Fig. 20). Fruit is also punctured by them and a few "pin-ricks" may spoil the fruit as first-grade fruit and much is ndered worthless. Roots of woody plants are also attacked nd galled as we see done by the Woolly Aphid (*Eriosoma nigerum*) (Fig. 21).

ATURAL ENEMIES OF APHIDES.

Aphides are preyed upon by many insects and some fungi. ow and again there is no doubt that these natural checks ontrol these insects. As a rule, however, these parasites and redaceous insects appear only in sufficient numbers to kill off e Plant Lice when they have increased to such an extent that e plants they attack have been seriously damaged or even estroyed.

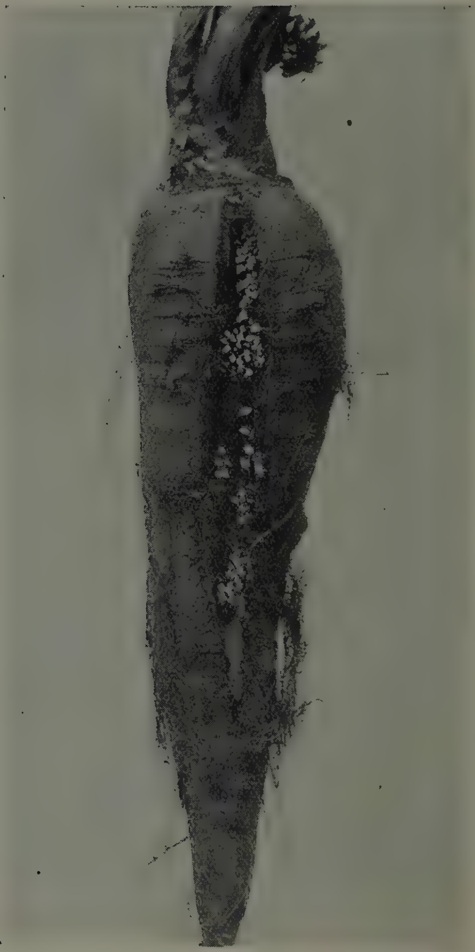


Fig. 17.
Aphid attack on Roots.
Anuraphis tulipæ Boyer causing splitting of carrot.

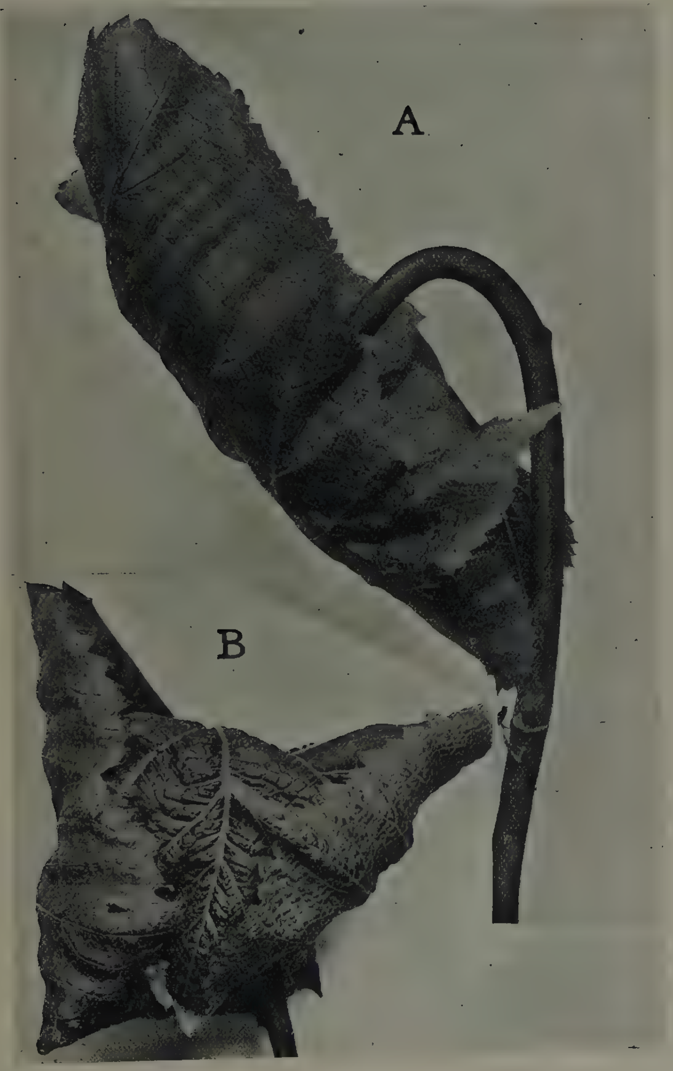


Fig. 18.
Leaf Nests of Lime Tree Aphid *Pachypappella reaumuri* Kalt.

The chief "Insect Enemies" are the Lady Bird Beetles, or *Coccinellidæ*, the Hymenopterous parasites, and the Syrphid larvæ. Both adult and larval Lady Birds prey upon Aphides, the larvæ being called "Niggers." The commonest are the Two Spotted Lady Bird (*Adalia bipunctata*) and the Seven Spotted Lady Bird (*Coccinella septempunctata*). The Dipterous family of Syrphidæ or Hover Flies, has also many species, which in their larval stages feed upon Plant Lice, their leech-like grubs destroy Aphides of all kinds and have a very marked effect at certain times in acting as a "natural control." The most important Syrphids are *Catabomba pyrastri*; *Syrphus balteatus*; and *S. ribesii*. The female Hover Flies drop their eggs, small, white, elongate oval bodies, among the colonies of Plant Lice and in a short space of time the groups of Aphides are devoured by the resulting larvæ. Another group of flies, the so-called Gall Midges, or *Cecidomyiidæ*, has also a number of species feeding upon Aphides and according to Miss D. J. Jackson, these small dipterous larvæ are of common occurrence in Scotland. They do not appear in any numbers in mid and south England. The species of Cecids that attack Aphides in these islands are at present unknown.

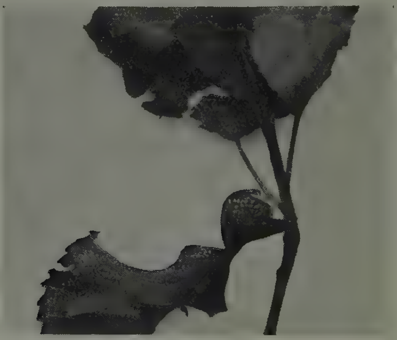


Fig. 19.
Leaf Stalk Gall on Poplar produced by *Pemphigus bursarius* Linn.

The beautiful Lace-Wing Flies, or *Chrysopidæ*, also act as natural checks. The females lay their long stalked eggs on leaves near to Aphid colonies and the larvæ coming from

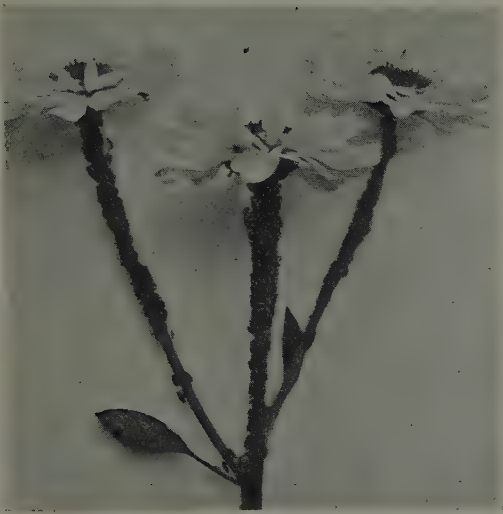


Fig. 20.
Clusters of Black Aphid *Aphis rumicis* Linnæus on Chamomile.

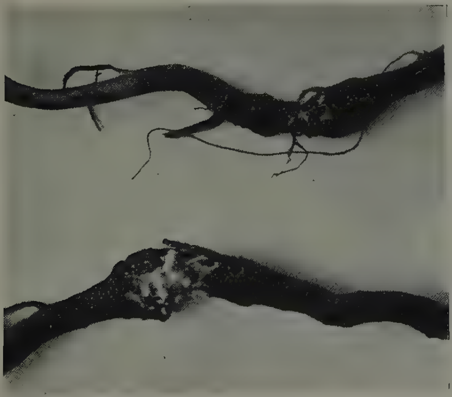


Fig. 21.
Root galls product by Woolly Aphid.

them—the so-called "Aphid Lions"—devour the Aphides in all stages. Most Plant Lice are also liable to attack by various Hymenopterous parasites, which lay their eggs in the bodies of the Aphides. The minute parasitic larvæ devour the internal parts and eventually fill the skin and from the dead insect, usually looking like a pearl-like body on the leaf, the minute parasite escapes through a small round hole in the dried skin. The majority of these parasites are *Braconidæ* and *Chalcididæ*. The Cabbage Aphid (*Brevicoryne brassicæ*) is frequently checked by such parasites, so also is the Thistle Aphis (*Anuraphis cardui*) and the Grass Myzus (*Myzus festucæ*) where whole colonies die off from the attack of such parasites. Buckton states that the Water Lilies at Hampton Court, which were often badly attacked by *Aphis nymphaeæ* were sometimes saved from destruction by a parasitic *Allotria*, which destroyed as many as ninety per cent. of the Aphides. Vine* says of an Aphis attacking the Holly, probably *A. ilicis*, that suddenly in one afternoon, most of the insects were struck by a parasite and he shows us that eighty-five per cent. were destroyed. The parasites were 164 Ichneumons, one Proctotrupid, three Chalcids and two other Chalcids which escaped. This gives a maximum possible percentage of hyper-parasites of 4.2 per cent. These Aphid parasites have very often parasites upon them—hyper-parasites. Miss M. Haviland has done much to unravel the strange Cynipid hyper-parasites of the old genus *Allotria*, now called *Charips*, Proc. Camb. Phil. Soc. xx., II., 235 (1920), and Quart. Journ. Micro. Sci., 65, II, 452 (1921). Aphides are also preyed upon by various bugs (*Capsidæ* and *Anthocoridæ*). McLachlan states that the *Lygæidæ* are also Aphis eaters. Saunders in his Monograph of the Heteroptera describes the *Anthocoridæ* generally as Aphis feeders. Anyway some are of use in checking these pests, especially *Anthocoris nemoralis* Fabricius, which the writer has frequently seen devouring the Hop Aphid and the Leaf Curling Apple Aphid (*Dentatus roseus* Baker). *Anthocoris nemorum* is also a great Aphid feeder. Most of the *Capsidæ* are vegetable feeders, but some are aphidivorous, especially *Capsus lanarius*, both larvæ and nymphæ sucking the juices. Douglas (Ent. Mo. Mag., Oct., 1895) and Vine, record attacks by this bug on Aphides. Besides *Capsus*, Vine mentions

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* Predacious and Parasitic Enemies of *Aphides*, p. 3 (1894).

Plagiognathus as an Aphid eater. Several *Arachnids* also feed on Plant Lice, but the names of these I have not yet been able to find out.

AVIAN ENEMIES OF APHIDES.

Many birds prey upon Plant Lice and undoubtedly do a great deal of useful work in keeping them in check. The Swallow and the House Martin devour enormous quantities of Aphides when migrating, and when here in this country. These useful birds have much decreased in numbers the last twenty-five years, partly due to their ruthless destruction abroad when migrating, and partly due to Sparrows driving them away from their nesting quarters in this country. The Chaffinch is another great Aphid destroyer. It feeds on many fruit tree Aphides. It hunts for such hibernators as the Woolly Aphid. Even the so-called "Avian Rat"—the Sparrow—is a great natural check to Plant Lice. This cosmopolitan and aggressive bird may often be seen clearing off the Black Fly (*Aphis rumicis*) on Beans, and the Green Pea Louse (*Macrosiphum pisi*) on field Peas. The writer once watched a large breadth of field Beans cleared entirely by Sparrows. The family of Tits or *Paridæ* hunt most assiduously for Aphides and their eggs on all fruit and forest trees, the Blue or Tom Tit (*Parus cæruleus*) being the most important. The Cole and Marsh Tits do the same. To a lesser extent we find the scarcer Tree Creeper (*Certhia familiaris*) and the Nuthatch (*Sitta europæa*) and even in some districts the beautiful little Golden Crested Wren feeding off many Aphides; the latter especially amongst Conifers. Many Flycatchers and other summer migrants also do much good.

FUNGI ATTACKING APHIDES.

Fungus enemies also prey upon Aphides and often occur in epizootic form. The writer has seen in one bad attack of *Aphis rumicis* in East Kent, the whole plague of Dolphins killed off by a fungoid enemy. In the South of England this only appears to occur now and again, but in Scotland Miss Dorothy Jackson has shown that the Aphides in North Britain are very prone to fungoid diseases. Many species she has kindly sent me show the spores of fungi filling their bodies.

Cook, in his most interesting book "Vegetable Wasps and Plant Worms" (1892) says speaking of Aphides: "These minute pests of the cultivator have at length been discovered by fungoid enemies and suffer tribulation. No less than five Entomophytes of the *Empusa* kind have been recorded as destroying them, and this so effectually that it has been proposed to utilise the fungus in order to reduce the number of insect pests in the conservatory. The three other parasites may possibly only be Saprophytes, but they find a place here, since they have never been found on any other substance. The *Isaria* is the only one which offers a probability of its being truly parasitic." The species of Fungi mentioned by Cook are as follows: Star-like Isaria (*Isaria stellata*), Planchon's Aphis Endophyte (*Empusa planchoniana* Corner); the Common Aphis Endophyte (*Entomophthora aphidis* Hoffman) (Fig. 22); Birch Aphis Endophyte (*Entomophthora occidentalis* Thaxter); Flask-shaped Endophyte (*Empusa lageniformis* Thaxter); Fresenius' Aphis Endophyte (*Empusa*

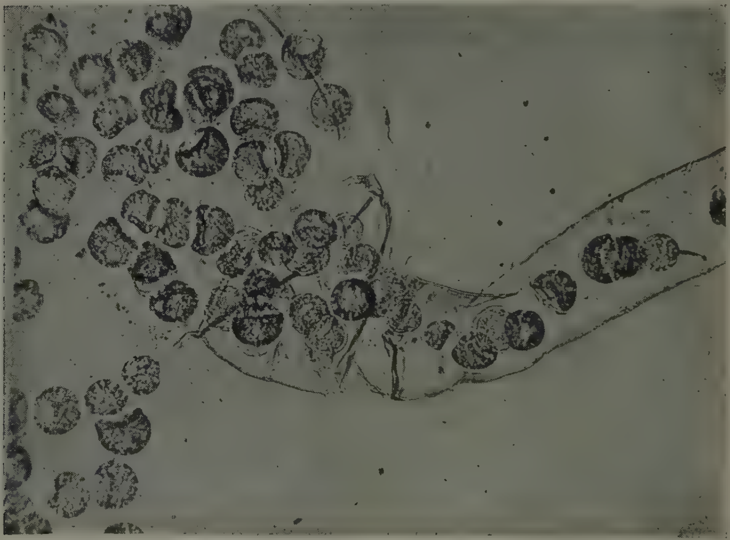

Fig. 22.

Leg of *Amphorophora cosmopolitana* Mason, showing spores of *Entomophthora aphidis* Hoffman. (Miss Jackson.)

fresenii, Nowa.); Aphis Chain Mould (*Oospora aphidis* Cooke and Mass.); Aphis Black Mould (*Cladosporium aphidis* Thum). Miss Jackson has found so many Aphides attacked by fungi in Scotland that she has had the following identified by Mr. Cotton, late Mycologist to the Ministry of Agriculture, *Empusa* (*Entomophthora*) *aphidis* Hoff., and *Empusa fresenii* Nowakowski on *Amphorophora cosmopolitana*, *Myzus persicæ*, and *Empusa fresenii* on *Capitophorus whitei*. In the North of Britain there is no doubt that these fungoid parasites control to no little extent these insects, but in the Midlands and the South of Britain one finds their beneficent activities much less developed. Cotton in a recent paper (Trans. Brit. Mycol. Soc., VI., pt. II, 200-202, 1919), records and redescribes *Empusa* (*Entomophthora*) *aphidis* Hoffman, on *Myzus lactucæ* Schrank, *M. allii* Jackson, and *Amphorophora cosmopolitana* Mason; and *Empusa* (*Triplosporium*) *fresenii* Nowakowski on *A. cosmopolitana* Mason, *Capitophorus whitei* Theobald and *Myzus persicæ* Sulzer., all from specimens collected by Miss Jackson in Scotland.

Miss Jackson, referring to *Entomophthora aphidis*, says it is very common and many Aphides are killed by it. Specimens in which the fungus is present are easily distinguished by the dull ochreous colour and opaque appearance, which is quite different from the shining look of healthy specimens. They present also a rough appearance due to the skin being distended all over into numbers of small elevations; each elevation being caused by a spherical spore cluster (of which the body is entirely made up), pushing the skin outwards. Aphides so killed remain attached to the leaves. *Empusa fresenii* is common to Europe and America. Miss Jackson observes that on *Myzus persicæ* the fungus is ochreous white in some specimens and pale pinkish in others. The insects adhere to the undersides of the potato leaves. I have also found one of these fungi on *Myzocallis myricæ* (Kaltenbach) from Scotland.

THE CLASSIFICATION OF THE APHIDIDÆ.

A number of methods of classifying the Aphididæ have been put forward and after due consideration the writer is of opinion that the most recent one formulated by Baker, with certain modifications, is by far the most rational, ("The Generic Classification of the Hemipterous Family Aphididæ." Bulletin

No. 826, U.S.A. Dept. of Agriculture. Professional Paper, Aug. 10th, 1920, pp. 89 + xvi plates. Washington, 1920).

The *Chermesidæ* and the *Phylloxeridæ* are treated here as families distinct from the Aphididæ.

The Key to the Sub-Families, Tribes, Sub-Tribes, and Genera is appended in the following pages, with certain modifications.

KEY TO SUB-FAMILIES OF THE APHIDIDÆ.

1. Sexual forms small, no proper mouth. Oviparous female producing only one egg. Cornicles much reduced or absent. Wax glands abundantly developed. Wing veins usually reduced. Antennal sensoria prominent. *Eriosomatinæ.*
   Sexual forms with functional mouth parts. Nearly all the ovarian tubes developed in the oviparous female. 2.
2. Radial sector of forewing inserted mesad of stigma. Sexes small. Oviparous female laying several ova. *Mindarinæ.*
   Radial sector not so inserted, but arising from the stigma. 3.
3. Usually gall makers. Wing veins much reduced so that the media is usually simple. Wax glands usual. Antennal sensoria annular. Aleyrodiform stages common. Sexes small and usually wingless. *Hormaphidinæ.*
   Not usually gall makers. Wing veins not usually much reduced. Wax glands not abundant. Antennal sensoria sub-circular or oval. Cornicles often little reduced. Alate males common. *Aphidinæ.*

Sub-family APHIDINÆ.

Out of the six Tribes of the Aphidinæ only four occur in Britain, namely Aphidini, Callipterini, Thelaxini and Lachnini.

The key to the Tribes is as follows:

1. Cornicles situated on broad flat cones. 2.
   Cornicles truncate or more or less elongate. 3.
2. Cornicles and antennæ hairy. Antennæ with flagellum short and thick. *Lachnini.*
   Cornicles and antennæ not hairy. Antennæ with flagellum long and slender. *Setaphidini.**
3. Cornicles with long hairs. (Fig. 23.) *Greenidini.**
   Cornicles without long hairs. 4.

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* These are not represented in Great Britain.

4. Thorax of alate ♀ with lobes not prominently developed. Large wax plates. One ovum usually laid. *Vacunini.*
Thorax of alate form with well developed lobes. Large wax glands usually absent. Oviparous females laying several ova. 5.

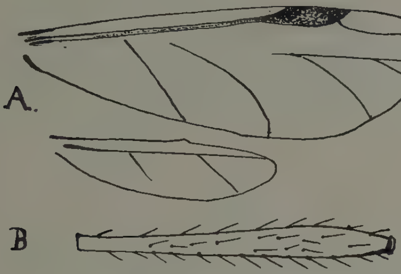

Fig. 23.—Tribe *Greenidini.*
A. Alate ♀ wings; B. Cornicle.

5. Cornicles truncate or elongate; cauda knobbed, anal plate bilobed or bifid or the antennæ prominently hairy. *Callipterini.*
Cornicles not truncate, usually long. Cauda never knobbed. Antennæ with only a few spine-like hairs. *Aphidini.*

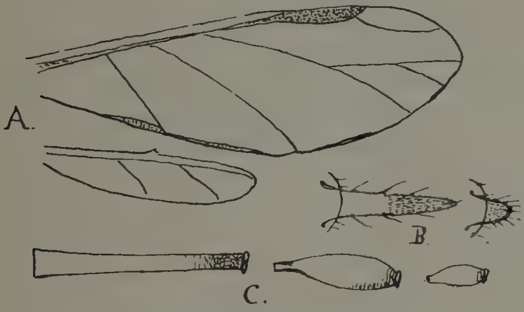

Fig. 24.—Tribe *Aphidini.*
Wings A; Cauda B; Cornicles C.

Tribe. APHIDINI. (Fig. 24.)

This tribe is divided into four sub-tribes, as follows:

1. Body covered with long projections. *Cervaphidina.*
Body naked, except for a few hairs. 2.

2. Head without prominent frontal tubercles. *Aphidina.*
Head with prominent frontal tubercles. 3.
3. Wings with radial sector normal. *Macrosiphina.*
Wings with radial sector more or less united with upper branch of the media or hind wings reduced. *Pentalonina.*

The first sub-tribe does not occur in Great Britain, and the latter is represented by two species only, both introduced, namely the Delicate Fern Aphid (*Idiopterus nephrelepidis*) and the Banana Aphid (*Pentalonia nigronervosa*) found in Kew Gardens.

Sub-tribe MACROSIPHINA.

Of the fifteen genera in this sub-tribe, only twelve seem to be known in Great Britain, namely *Macrosiphum*, *Macrosiphoniella*, *Myzus*, *Amphorophora*, *Megoura*, *Capitophorus*, *Rhopalosiphoninus*, *Phorodon*, *Hyalopteroides*, *Trilobaphis*, *Jacksonia* and *Neomyzaphis*.

The key to the genera is as follows :

1. Cornicles swollen. 2.
Cornicles cylindrical or tapering, scarcely swollen. 6.
2. Cornicles cylindrical at base and extremity, abruptly swollen in middle. *Rhopalosiphoninus.*
Cornicles swelling gradually. 3.
3. Head with large central process on vertex. 4.
Head without such process on vertex. 5.
4. Antennal tubercles converging ; head and basal antennal segments with many prominent capitate hairs. *Capitophorus.*
5. Antennal tubercles large and diverging.
Cornicles much longer than cauda, which is somewhat tapering. *Amphorophora.*
Cornicles about length of cauda, which is usually constricted near base. *Megoura.*
6. Cornicles very small, much smaller than the long, broad cauda. *Hyalopteroides.*
Cornicles as long as or longer than cauda. 7.
7. Head with prominent elongate projections to the antennal tubercles, most evident in apteræ ; cornicles cylindrical. *Phorodon.*
Head with a marked median lobe, cornicles thick. *Trilobaphis.*
Head without such projections. 8.

8. Tubercles strongly converging. Cauda small. *Myzus.*
Tubercles small. Cauda long. *Neomyzaphis.*
Apex of cornicles sloping. *Jacksonia.*
Tubercles strongly diverging. 9.

9. Cornicles thick, about as long as cauda, which is large and somewhat constricted at base. *Macrosiphoniella.*
Cornicles very long, rather slender and somewhat tapering. 10.

10. Cauda elongate, constricted near the base. *Macrosiphum.*
Cauda moderate or elongate, not constricted near base. 11.

11. First antennal segment and abdominal segments with long finger-like tubercles in apteræ. *Acanthaphis.*
Without these. *Illinoia.**

Sub-tribe PENTALONINA.

This sub-tribe of the Aphidini is marked by the peculiar venation. The radial sector is more or less united with the upper branch of the media and the hind wings are reduced. Of the five genera known only two occur in Britain, namely:

Idiopterus, found on Ferns under glass and which is becoming a serious pest (this is undoubtedly an introduced insect); and *Pentalonia* Coquerel once found at Kew Gardens.

Genus IDIOPTERUS Davis.

A single species only occurs, the *Idiopterus nephrelepidis* Davis, a very marked and beautiful Aphid on ferns. It appears to be the least specialised of the sub-tribe.

Characters: Head with prominent frontal tubercles, which are gibbous and project inwards. Cornicles slender, cylindrical, sometimes showing slight swellings. Cauda conical and somewhat elongate. Antennæ of six segments: i. gibbous, sensoria rounded. Front wings with radial sector extending more or less abruptly downwards from the stigma more or less parallel with the upper branch of the media with which it may become almost united. The hind wings have both media and cubitus present.

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* The difference between *Illinoia* and *Macrosiphum* is very slight, being based only on the comparative length of the cauda. Typical *Illinoia* have it distinctly conical, but from that form to the long cauda in *Macrosiphum* there are many intermediate species.

Genus PENTALONIA Coquerel.

A single species again only occurs in this genus, the *Pentalonia nigronervosa* of Coquerel, found on Bananas, etc. The characters of this genus are as follows: Head with prominent antennal tubercles which are, more especially in the apterous form, projected inward, gibbous and somewhat *Myzus*-like in appearance. Antennæ of six segments, armed with subcircular sensoria, segment i. gibbous like the antennal tubercles. Cornicles somewhat constricted near their middle, then again somewhat swollen near their distal extremity; cauda rather small but elongate, sub-conical, slightly constricted about the middle. Fore wings with the radial sector extending abruptly downward and meeting the upper branch of the media with which it fuses but is divergent again toward its natural course near the tip of the wing. A closed cell is thus formed by the radial sector and the media, but at the margin of the wing there are the same veins as in the Aphidina. Hind wings very much reduced, cubitus absent.

Type *Pentalonia nigronervosa* Coq.

Sub-tribe APHIDINA.

This sub-tribe contains Aphides of very divergent appearance and which show much variation in regard to the cornicles and cauda. The absence of prominent frontal (or as Baker calls them, antennal) tubercles, however, unites this group. The cornicles show such marked variation that they are of no diagnostic value for this sub-tribe. In one genus (non-British) called *Asiphonaphis* (Wilson and Davis) there are no cornicles at all; some such as *Aphis* have them rather long and cylindrical, others as *Liosomaphis* long and vasiform, whilst in *Brevicoryne* they are small and swollen in the middle.

Similarly the cauda varies: in *Anuraphis* it is small and often hidden, in *Hyadaphis* it is long and broad. Most feed on low growing herbs, plants and shrubs; a few on trees.

Of the twenty-five genera accepted by Baker, only thirteen occur in Great Britain, and one of these, *Acaudus*, is only Del Guercio's *Anuraphis*. Another genus has been formulated by myself, *Aphidiella*, so that the number actually reaches thirteen.

The key to the genera is as follows:

1. Cornicles absent. *Asiphonaphis.*
Cornicles present. 2.
2. Cornicles swollen, not cylindrical or tapering. 3.
Cornicles sub-cylindrical or tapering, but often very short or ring-like. 12.
3. Fore wings with media once branched, apterous form with very much swollen cornicles. *Vesiculaphis.*
Fore wings with media twice branched. 4.
4. Hind wings without cubitus. *Carolinaia.*
Hind wings with media and cubitus. 5.
5. Abdomen with dorsal tubercle over cauda. 6.
Abdomen without dorsal tubercle. 7.
6. Tubercle very large, entirely covering posterior part of body; cornicles small, opening at side. *Aspidaphis.*
Tubercle moderate, as large as cauda in apterous form; cornicles normal. *Cavariella.*
7. Cornicles long, abruptly and distinctly swollen. *Liosomaphis.*
Cornicles of various lengths, gradually swollen. 8.
8. Cauda short and abruptly conical; cornicles about same length as cauda, swollen in middle. *Brevicoryne.*
Cauda not strikingly short or abruptly conical. 9.
9. Cornicles as short as the width of cauda at base, or shorter. 10.
Cornicles as long as or longer than cauda. 11.
10. Cornicles minute, tubercle-like. *Brachycolus.*
Cornicles considerably longer than their diameter; cauda, particularly in apteræ, large and long. *Hyalopterus.*
11. Cauda in apteræ long and broad, as long as the cornicles. *Hyadaphis.*
Cauda shorter than cornicles, not correspondingly long and broad. *Rhopalosiphum.*
12. Tarsi atrophied. 13.
Tarsi normal. 14.
13. Antennæ of six segments, cornicles rather short. *Atarsos.*
Antennæ of five segments; cornicles very long and slender. *Mastopoda.*
14. Cauda apparently absent or a mere rounded plate-like body. 21.
Cauda normal, but often very short. 15.

15. Fore wings with media once branched. 22.
Fore wings with media twice branched. 16.
16. Antennæ of five segments. 24.
Antennæ of six segments. 17.
17. Cornicles small, as short as width of cauda at base, which is without constriction. 18.
Cornicles usually as long as or longer than cauda, Aphis-like. 19.
18. Cauda long and large, with few hairs in the apteræ. Flagellum longer than base of vi. *Pergandeida.*
Cauda very long, with many hairs; flagellum about equal to base. *Longicaudus.*
Cauda extremely short and sub-conical. *Microsiphum.*

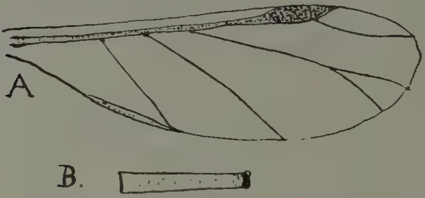

Fig. 25.—Genus *Toxoptera.*
A. Fore wing; B. Cornicle.

19. Cauda short and abruptly conical. *Anuraphis.*
Cauda elongate and constricted near base. 20.
20. Hind wings with media and cubitus present. *Aphis.*
Hind wings with only one oblique vein. *Hysteroneura.*
21. Cornicles minute, not as long as wide. *Cryptosiphum.*
22. Antennæ of six segments. *Toxoptera.*
Antennæ of five segments. 23.
23. Apterous form with a prominent median projection on the vertex and with antennæ of 4 segments, cornicles minute. *Sanbornia.*
Apterous form normal. *Yamataphis.*
24. Cornicles elongate, Aphis like. *Cerosipha.*
Cornicles extremely short, body of apteræ much arched. *Siphonatrophia.*

Tribe CALLIPTERINI.

In this tribe, which may be told as a rule by the knobbed cauda and the bilobed or bifid anal plate, many diverse forms occur, most have short truncate cornicles, some (*Drepanosiphum*) have long cornicles, but marked knobbed cauda, others (*Chaitophorus*) can be told by the hairy antennæ and short truncate cornicles. Most live on the foliage of deciduous trees, but one (*ononidis*) lives on herbs and a new species described here, on Juniper. Some are colonial, others solitary. Some are very active and have developed saltatory powers, as seen in the genus *Saltusaphis*, Theobald. The males are usually alate, but in the last mentioned genus they are apterous. In *Chaitophorus populi* the males are both alate and apterous. The oviparous females are apterous, but in the *Phyllaphidina* alate ovipara may occur. Of the eight sub-tribes given by Baker, six occur in Britain, namely *Pterocommina*, *Chaitophorina*, *Phyllaphidina*, *Callipterina*, *Drepanosiphina* and *Saltusaphidina*.

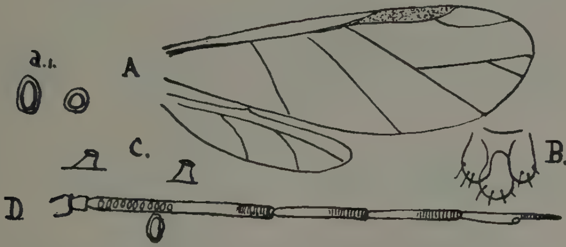

Fig. 26.—Tribe *Callipterini*. *Therioaphis tiliæ*.
A. Alate ♀ wings ; B. Cauda and anal plate ; C. Cornicles ; D. Antenna ; d^{1} further enlarged sensoria.

The key to these sub-tribes is as follows :

1. Eyes with ocular process present, head not elongate. 2.
   Eyes without ocular process, head elongated. *Saltusaphidina.*
2. Antennæ with rather long prominent hairs. 3.
   Antennæ usually with minute, sometimes stout hairs. 5.
3. Cornicles absent. *Fullawayina.*
   Cornicles present. 4.
4. Cornicles cylindrical or vasiform. *Pterocommina.*
   Cornicles truncate, enlarged at base. *Chaitophorina.*

5. Cornicles absent above. *Monaphidina.*
   Cornicles present, position as usual. 6.
6. Cornicles reduced to mere rings, large lateral abdominal wax plates. *Phyllaphidina.*
   Cornicles usually not reduced to mere rings, no large wax plates. 7.
7. Cornicles usually long and somewhat swollen. *Drepanosiphina.*
   Cornicles short and truncate. *Callipterina.*

Sub-tribe PHYLLAPHIDINA.

Only one genus occurs in this country, namely *Phyllaphis*, in which the cauda is knobbed and the anal plate slightly bilobed.

Sub-tribe CALLIPTERINA.

Of the eight genera accepted, seven occur in Britain.

Key to genera of Callipterina.

1. Cauda distinctly knobbed, anal plate usually bilobed or somewhat deeply divided. 3.
   Cauda not distinctly knobbed, anal plate entire or almost so. 2.
2. Antennæ minutely setose, sensorium at base of flagellum oval or somewhat rounded; oviparous female with secondary sensoria. *Symydobius.*
   Antennæ not minutely setose, sensorium at base of flagellum long and narrow, oviparous female without secondary sensoria. *Euceraphis.*
3. Anal plate deeply divided with a V-shaped cleft, so that the lobes appear as distinct; cauda knobbed. *Therioaphis.*
   Anal plate bilobed, not deeply divided; cauda very markedly knobbed. 4.
4. Antennæ and often the cornicles with prominent hairs. *Callipterus.*
   Antennæ and cornicles without hairs. 5.
5. Cornicles much reduced, wings somewhat horizontal in repose. *Monellia.*
   Cornicles truncate, wings not horizontal in repose. 6.
6. More or less distinct antennal tubercles present; oviparous female with secondary sensoria. *Calaphis.*
   No distinct antennal tubercles present; oviparous female without secondary sensoria. 7.

7. Anal plate slightly indented; sometimes almost entire; no apterous viviparæ. *Chromaphis.*
   Anal plate distinctly bilobed; apterous viviparæ common. *Myzocallis.*

Sub-tribe SALTUSAPHIDINA.

This sub-tribe is separated by having no ocular processes. Two genera occur, both in Britain.

1. Head elongate, cornicles cup-shaped, legs modified for leaping. *Saltusaphis.*
2. Head not much elongated; cornicles as mere rings, legs not modified for leaping. *Thripsaphis.*

Sub-tribe DREPANOSIPHINA.

The British species in this sub-tribe have usually been placed with the Macrosiphini. The knobbed cauda at once separates them and places them in the above sub-tribe. Three genera occur in this sub-tribe, of which one, *Drepanosiphum*, occurs in Great Britain. The cornicles are extremely long and somewhat swollen in the middle.

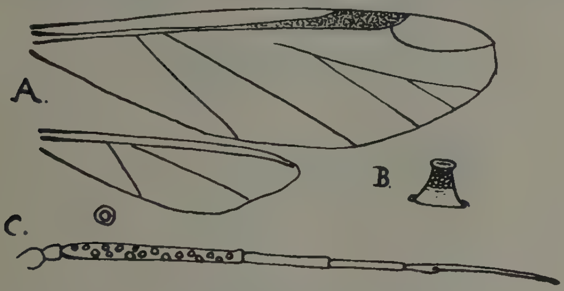

Fig. 27.—Sub-tribe *Chaitophorina.*
Periphyllus aceris.
A. Alate ♀ wings; B. Cornicle; C. Antenna.

Sub-tribe MONAPHIDINA.

A single genus, *Monaphis*, only occurs and is found in Britain. It can at once be told by the absence of outstanding cornicles.

Sub-tribe CHAITOPHORINA.

Closely allied to the *Callipterina*, but always with long hairs on antennæ and body.

Key to genera of Chaitophorina.

1.	Cauda distinctly knobbed.	2.
	Cauda not knobbed.	3.
	Cauda with parallel sides.	6.
2.	Antennæ of five segments.	*Sipha.*
	Antennæ of six segments.	*Chaitophorus.*
3.	Body elongate.	*Periphyllus.*
	Body not elongate.	4.
4.	Antennæ of five segments.	*Atheroides.*
	Antennæ of six segments.	5.
5.	Anal plate entire or slightly indented.	*Neothomasia.*
	Anal plate divided into two quite separate parts.	*Patchia.*
	Antennæ of five segments.	*Laingia.*

The genera *Sipha, Chaitophorus, Laingia* and *Periphyllus* occur in Great Britain. Haliday's *Atheroides* is placed here, but I am inclined to think it should come in the Lachnina.

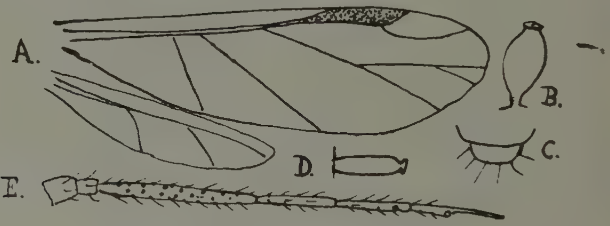

Fig. 28.—Sub-tribe *Pterocommina.*
A. C. D. E. *Pterocomma populea* ; B. *Melanoxantherium salicis.*

Sub-tribe Pterocommina.

Two genera are placed here, both occur in Great Britain. They tabulate as below :

Cornicles cylindrical or slightly swollen.	*Pterocomma.*
Cornicles much swollen.	*Melanoxantherium.*

The other sub-tribe of the Callipterini, namely *Fullawayina*, has not been found in these Islands.

Tribe Vacunini.

There are no sub-tribes in this. Two genera occur, *Vacuna* and *Glyphina*, both of which occur in Britain. This tribe is usually spoken of as the *Vacunini*, but the insects have been placed in the *Eriosomatinæ*, chiefly because the oviparous female lays only one egg. It is, however, an anomalous group that bears certain close relations to the *Hormaphidinæ*. Cornicles are present, as chitinous rings, on slight hairy cones. The cauda is usually distinctly knobbed, but may be somewhat semi-circular. The antennæ are rather short, with oval or circular sensoria. The body has either stout spines or marked hairs. The sexuales are both apterous and the female produces but one ovum. They live freely on the foliage of trees. The two genera tabulate as follows :

1. Cauda knobbed. *Vacuna.*
2. Cauda not knobbed, but somewhat semi-circular. *Glyphina.*

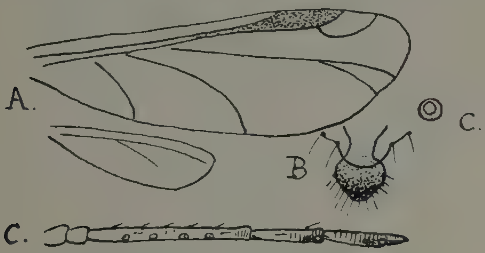

Fig. 29.—Tribe *Vacunini.*
Vacuna dryophila.
A. Wings ; B. Cauda and anal plate ; C. Antenna.

I have provisionally followed Baker here, for I do not feel certain that the two genera should be placed together, the markedly knobbed cauda of *Vacuna* being so different from the cauda of *Glyphina.*

Tribe Lachnini.

This large tribe contains five sub-tribes, of which four are represented in Great Britain. They mostly feed on Conifers, but some, such as *Anoecia*, feed on other woody vegetation and the *Tramina* are subterranean. I think that there is little doubt that the latter should form a distinct tribe ; their subterranean habits and their marked hind tarsi separating them from all other Aphides. Like the typical Lachnid, they have antennæ of six segments, with a short flagellum ; the venation is similar. The cauda and anal plate are always rounded. The oviparous females appear to be always apterous ; the males alate.

Baker's key to the sub-tribes is as follows :

1. Radial sector of fore wings curved and of moderate length. 2.
   Radial sector of fore wings short and straight, placed near tip of wing. 4.
2. Hind tarsi much elongated ; head divided. *Tramina.*
   Hind tarsi normal. 3.
3. Stigma short and thick, sexes apterous. *Anoecina.*
   Stigma elongate. *Pterochlorina.*
4. Elongate and narrow ; cornicles non-hairy ; no ocular tubercles. *Eulachnina.*
   Not elongate ; cornicles hairy ; eyes with ocular tubercles. *Lachnina.*

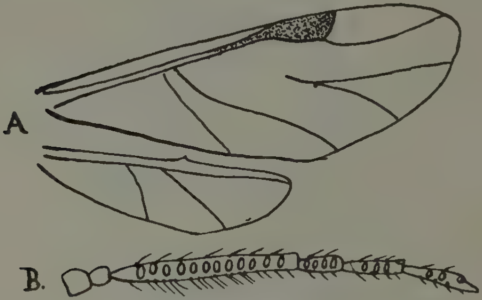

Fig. 30.—Sub-tribe *Anoecina.* *Anoecia corni.*
A. Wings ; B. Antenna.

Sub-tribe ANOECINA.

A single genus only occurs in Britain, namely *Anoecia*, often placed with the *Eriosomatinæ.*

Sub-tribe EULACHNINA.

A single genus, *Eulachnus*, only occurs here.

Sub-tribe LACHNINA.

Baker divides this into four genera :

1. Media of fore wings twice branched. *Dilachnus.*
   Media not twice branched. 2.
2. Media once branched. 3.
   Media simple. *Unilachnus.*
3. Labium lance-like. *Lachnus.*
   Labium obtuse. *Schizolachnus.*

Sub-tribe PTEROCHLORINA.

Three genera occur, viz., *Longistigma*, *Stomaphis* and *Pterochlorus*. The last two occur in these Islands. The genera tabulate as follows :

1. Stigma extending along costal margin to apex of wing. *Longistigma.*
   Stigma not so extending. 2.
2. Rostrum extremely long, very much longer than body ; antennæ with short, fine hairs. *Stomaphis.*
   Rostrum normal ; antennæ often long, with short hairs. *Pterochlorus.*

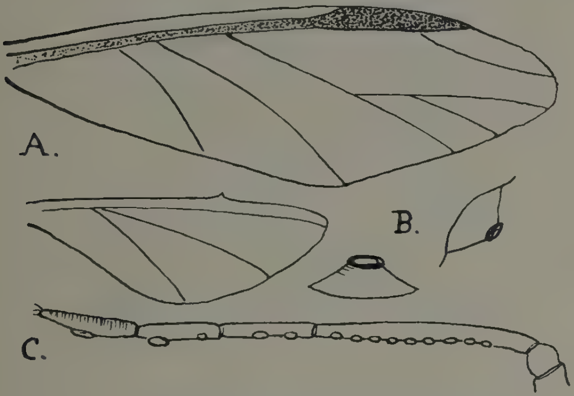

Fig. 31.—Tribe *Lachnina*.
A. Wings ; B. Cornicles ; C. Antenna.

Sub-tribe TRAMINA.

Specialised aphides, subterranean and frequently associated with ants. There are three genera :

1. Apteræ without cornicles and with rudimentary eyes. *Trama.*
   Apteræ with cornicles. 2.
2. Apteræ with large Lachnus-like cornicles and compound eyes. *Protrama.*
   Apteræ with small cone-like cornicles with a few hairs and more or less rudimentary eyes. *Neotrama.*

All three occur in Great Britain.

Sub-family ERIOSOMATINÆ.

This sub-family is divided into five tribes; four of which occur in Great Britain, viz., the *Fordini*, *Pemphigini*, *Prociphilini* and *Eriosomatini*. The first of these are subterranean and are closely connected with ants. (The others are notably gall or pseudo-gall formers.) I am not aware of any sexual forms of *Fordini* having been found, and the alate females are very rare. There is so much at variance between the genera found, not only in Great Britain (*Forda*, *Geoica* and *Paracletus*), but elsewhere (*Rectinasus*) that I have followed Baker with much hesitation in placing any of them in this sub-family, certainly *Paracletus* should come out. The other three tribes naturally fall in this sub-family.

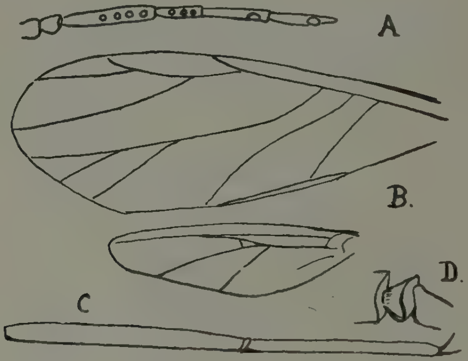

Fig. 32.—Tribe *Tramina*. *Trama troglodytes*.
A. Antenna; B. Wings; C. Hind tibia and tarsus;
D. Joint of tarsus and tibia.

The key to the Tribes of Eriosomatinæ is given as follows:

1. Cornicles present at least in the alatæ; often but mere rings. 4.
   Cornicles absent. 2.
2. Forms living in galls or pseudo-galls on plants. 3.
   Forms subterranean; antennæ of alatæ rather short and thick, with oval or round sensoria. *Fordini.*
3. Forms living in galls and without wax plates prominently developed on head and thorax of alatæ. Antennæ with annular sensoria. *Melaphini.*

Forms living in pseudo-galls, occasionally in true galls. Antennæ of alatæ rather long and slender, with narrow, oval or rounded sensoria. Wax plates well developed on head and thorax of alatæ which leave the galls in spring. *Prociphilini.*

4. Forms living in galls, pseudo-galls, or free; wax glands prominent; antennæ of alatæ with annular sensoria which nearly encircle the segments. *Eriosomatini.*

   Forms living usually in true galls; wax glands present but not prominent. Antennæ of alatæ with narrow transverse sensoria, somewhat oval or irregular, a few with no sensoria. *Pemphigini.*

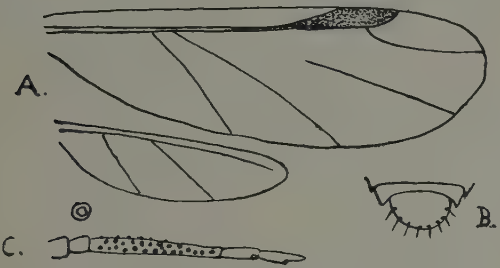

Fig. 33.—Tribe *Fordini*. *Forda viridana*.
A. Wings; B. Cauda; C. Antenna.

Tribe FORDINI.

All subterranean forms, mainly connected with ants. The three genera tabulate as below:

1. Alate antennæ of five segments. *Forda.*

   Alate antennæ of six segments. 2.

2. Sensoria of alate antennæ small and over most of segment; apteræ with antennæ of 6 segments; body flattened. *Paracletus.*

   Sensoria of alate antennæ larger and more evenly placed. Apteræ with five or six segments to antennæ. *Geoica.*

All three occur in Great Britain.

Tribe ERIOSOMATINI.

Mainly gall-formers. Typical host plant, the Elm. Subterranean races occur.

The key to the genera is as follows:

1. Media of alate fore wings once branched. 3.
Media simple. 2.

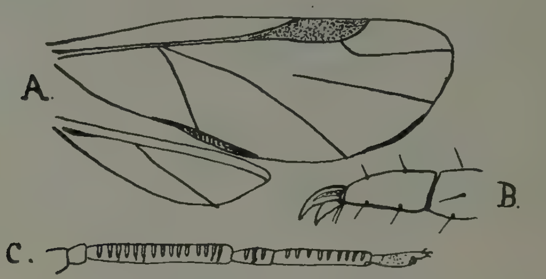

Fig. 34.—Tribe *Eriosomatini*. *Tetraneura ulmifoliæ*.
A. Alate ♀ wings; B. Tarsus.

2. Hind wings with media and cubitus present. *Gobaishia.*
Tarsi of apteræ of only 1 segment.
Hind wings with only media. Cornicles present. *Tetraneura.*
Cornicles as mere pores. *Truncaphis.*
3. Hind wings with media and cubitus. *Eriosoma.*
Hind wings with only media. 4.

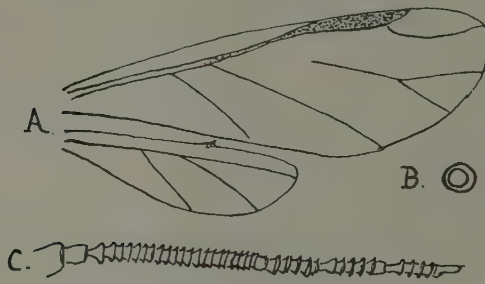

Fig. 35.—Tribe *Eriosomatini*. *Eriosoma lanigerum*.

4. Stem mother with antennæ of 4 segments; alate antennæ rather short and thick. *Colopha.*
Stem mother with antennæ of 5 segments; alate antennæ long and slender. *Georgia.*

Eriosoma, *Tetraneura*, *Truncaphis* and *Gobaishia* occur in Great Britain.

Tribe PEMPHIGINI.

Mostly gall formers.

The key to genera is as follows:

1. Flagellum of alate antennæ long and Aphis-like. *Mordwilkoja.*
   Flagellum short and knob-like. 2.
2. Media once branched. 3.
   Media simple. 4.
3. Alate antennæ usually without secondary sensoria. Wings flat in repose. *Phlæomyzus.*
   Alate antennæ with secondary sensoria. Wings not flat in repose. *Pachypappella.*

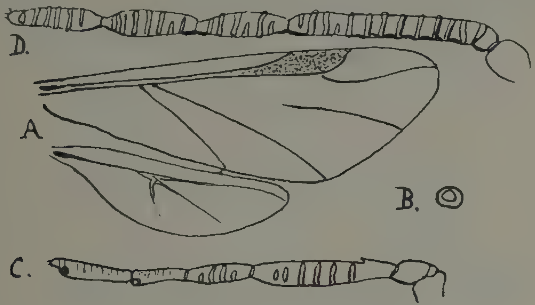

Fig. 36.—Tribe *Pemphigini.*
Pemphigus filaginus.
A. Wings of female; B. Cornicle pore; C. Antenna of fundatrigenia; D. Antenna of sexupara.

4. Both media and cubitus present in hind wings. 5.
   One oblique vein only in hind wings. *Dryopeia.*
5. Alate antennæ without secondary sensoria. *Rhizoctonus.*
   Alate antennæ with secondary sensoria. 6.
6. Alate antennæ rather short and thick. Stem Mother with four segmented antennæ. *Pemphigus.*
   Alate antennæ rather long and slender. Stem Mother with five segmented antennæ. *Cornaphis.*

Three genera, Pachypappella, Phlæomyzus and Pemphigus, occur in Great Britain.

Tribe PROCIPHILINI.

Specialised Aphides in which the cornicles have completely disappeared and are replaced by large wax glands. Some

(*Thecabius*) are gall-formers, others produce pseudo-galls, others (*Asiphum*) live free upon leaves or wood.

The four genera tabulate as follows :

1. Media once forked ; stem mother usually without wax plates. *Asiphum.*
   Media simple ; stem mother with rows of wax plates. 2.
2. Wax plates large, those on thorax well developed ; Stem mother and young living together. 3.
   Wax plates not well developed ; Stem mother usually living in a gall by herself. *Thecabius.*
3. Sensoria narrow, linear, ciliate. *Prociphilus.*
   Sensoria somewhat oval, non-ciliate. *Neoprociphilus.*

The first three genera occur in Great Britain.

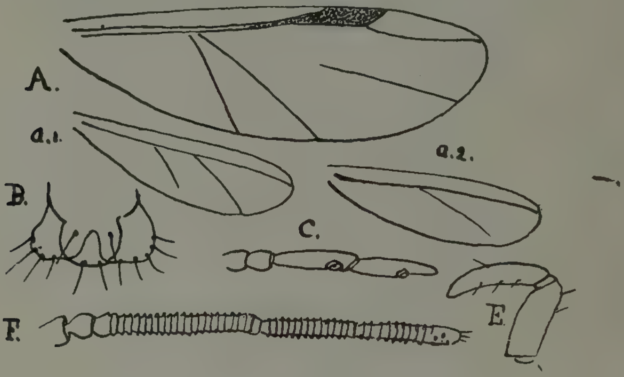

Fig. 37.—Tribe *Hormaphidini.*
Hamamelistes betulæ.
A. Wings ; B. Cauda and anal plate ; C. Apterous ♀ antenna ;
E. Antenna of alate ♀ ; E. Leg ; a^1 and a^2. Hind wings.

Sub-family MINDARINÆ.

This contains but a single genus—*Mindarus*, which is usually considered one of the Pemphigini, but Baker raises it to sub-family rank. It appears to be the most primitive type existing, having retained the predominant wing structure of the Fossil Aphides. The formation of the stigma is unlike any other living Aphids, but exactly agrees with that of the fossil forms, according to Baker. The only existing species was described by Koch as *Mindarus abietinus*, which has recently been found in Great Britain at Kew.

Sub-family HORMAPHIDINÆ.

This sub-family is divided into three tribes :

1. Aleyrodiform generations developed. 2.
Aleyrodiform generations not developed. *Oregmini.*
2. Cornicles absent ; usually gall-formers. *Hormaphidini.*
Cornicles usually present ; not usually gall-formers. *Cerataphidini.*

The first is not represented in Great Britain.

Tribe HORMAPHIDINI.

Two genera occur here, namely *Hormaphis* and *Hamamelistes* which tabulate as follows :

Antennæ of alatæ composed of three segments ; hind wings only with media. *Hormaphis.*
Antennæ of alatæ composed of five segments ; hind wings with both media and cubitus. *Hamamelistes.*

The last only is known in Great Britain.

Tribe CERATAPHIDINI.

The quaint apteræ are scale-like and live on leaves. The alatæ possess annular sensoria. Wax glands abundant.

Three genera occur, one of which has been found in Great Britain (*Cerataphis*). They tabulate as below :

Antennæ of aleyrodiform generations of five segments. *Aleurodaphis.*
Antennæ of same of four segments. *Cerataphis.*
Antennæ of same of three segments. *Thoracaphis.*

LIST OF GENERA FOUND IN BRITAIN.

Sub-family APHIDINÆ.

Tribe APHIDINI.

Sub-tribe MACROSIPHINA.

Genus *Macrosiphum* Passerini.
,, *Macrosiphoniella* Del Guercio.
,, *Megoura* Buckton.
,, *Amphorophora* Buckton.
,, *Rhopalosiphoninus* Baker.
,, *Capitophorus* Van der Goot.

Genus *Myzus* Passerini.
,, *Hyalopteroides* Theobald.
,, *Trilobaphis* Theobald.
,, *Jacksonia* Theobald.
,, *Phorodon* Passerini.
,, *Neomyzaphis* gen. nov.

Sub-tribe PENTALONINA.

Genus *Idiopterus* Davis.
,, *Pentalonia* Coquerel.

Sub-tribe APHIDINA.

Genus *Aphis* Linnæus.
,, *Anuraphis* Del Guercio.*
,, *Rhopalosiphum* Koch.
,, *Hyadaphis* Kirkaldy.
,, *Cavariella* Del Guercio.
,, *Liosomaphis* Walker.
,, *Brevicoryne* Van der Goot.
,, *Hyalopterus* Koch.
,, *Toxoptera* Koch.
,, *Cryptosiphum* Buckton.
,, *Brachycolus* Buckton.
,, *Aphidiella* Theobald.
,, *Pergandeida* Schouteden.
,, *Longicaudus* Van der Goot.
,, *Aspidaphis* Gillette.

Tribe CALLIPTERINI.

Sub-tribe CALLIPTERINA.

Genus *Myzocallis* Passerini.
,, *Chromaphis* Walker.
,, *Calaphis* Walsh.
,, *Callipterus* Koch.
,, *Therioaphis* Walker.
,, *Euceraphis* Walker.
,, *Symydobius* Mordwilko.

Sub-tribe PHYLLAPHIDINA.

Genus *Phyllaphis* Koch.

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* Van der Goot's *Acaudus* founded on *lychnidis* is this genus, *lychnidis* being a typical *Anuraphis*.

Sub-tribe CHAITOPHORINA.

Genus *Chaitophorus* Koch.
,, *Periphyllus* Van der Hoeven.
,, *Sipha* Passerini.
,, *Laingia* Theobald.
,, *Atheroides* Haliday.

Sub-tribe PTEROCOMMINA.

Genus *Pterocomma* Buckton.
,, *Melanoxantherium* Schouteden.

Sub-tribe DREPANOSIPHINA.

Genus *Drepanosiphum* Koch.

Sub-tribe MONAPHIDINA.

Genus *Monaphis* Walker.

Sub-tribe SALTUSAPHIDINA.

Genus *Saltusaphis* Theobald.
,, *Thripsaphis* Gillette.

Tribe VACUNINI.

Genus *Vacuna* Heyden.
,, *Glyphina* Koch.

Tribe LACHNINI.

Sub-tribe ANOECINA.

Genus *Anoecia* Koch.

Sub-tribe TRAMINA.

Genus *Trama* Heyden.
,, *Protrama* Baker.
,, *Neotrama* Baker.

Sub-tribe LACHNINA.

Genus *Lachnus* Burmeister.
,, *Schizolachnus* Mordwilko.
,, *Dilachnus* Baker.

Sub-tribe EULACHNINA.

Genus *Eulachnus* Del Guercio.

Sub-tribe PTEROCHLORINA.

Genus *Pterochlorus* Rondani.
,, *Stomaphis* Walker.

Sub-family ERIOSOMATINÆ.

Tribe ERIOSOMATINI.

Genus *Eriosoma* Leach.
,, *Tetraneura* Hartig.
,, *Truncaphis* Theobald.
,, *Gobaishia* Matsumura.

Tribe PEMPHIGINI.

Genus *Pemphigus* Hartig.
,, *Pachypappella* Baker.

Tribe PROCIPHILINI.

Genus *Prociphilus* Koch.
,, *Thecabius* Koch.
,, *Asiphum* Koch.

Tribe FORDINI.

Genus *Forda* Heyden.
,, *Geoica* Hart.
,, *Paracletus* Heyden.

Sub-family MINDARINÆ.

Genus *Mindarus* Koch.

Sub-family HORMAPHIDINÆ.

Tribe HORMAPHIDINI.

Genus *Hamamelistes* Shimer.

Tribe CERATAPHIDINI.

Genus *Cerataphis* Lichtenstein.

Sub-family
APHIDINÆ

Tribe Aphidini.

Sub-tribe *Macrosiphina.*

Genus MACROSIPHUM Passerini.
„ *Siphonophora* Koch.
„ *Nectarophora* Oestlund.
„ *Macrosiphon* Del Guercio.

Passerini, Gli Afidi 27 (1860); Koch, Die Pflanzenlaüse Aphidien, 150 (1855); Oestlund, Minn. Geol. Surv. Bull. 4, 78 (1887); Del Guercio, Redia Vol., 9, 188 (1913); Theobald, Journ. Eco. Biol. VIII (1913); Baker, Bull. 826, U.S.A. Dep. Agri. (1920).

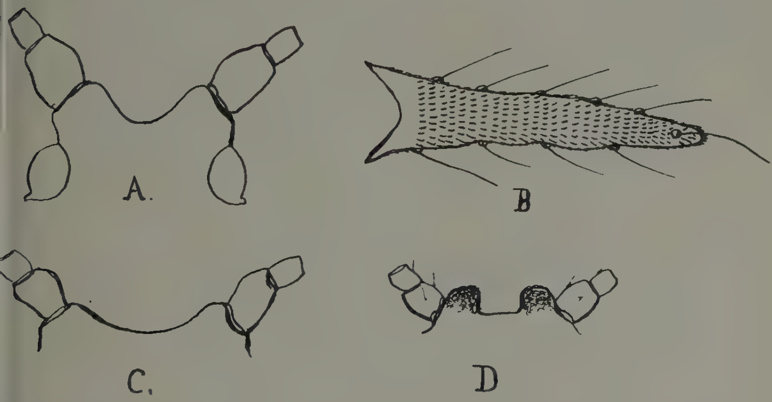

Fig. 38.
A. and C. Frontal lobes in Macrosiphum; D. in Myzus; B. Cauda of Macrosiphum.

Characters. Frontal tubercles very prominent and markedly divergent. Antennæ long, as long as or longer than the body, of six segments; flagellum long; third segment longer than the fourth, with circular sensoria in alatæ and sometimes in the apteræ, and in the alatæ with sensoria now and then present on the fourth segment. Cornicles long, cylindrical, rather thin and often tapering towards the apex. Cauda long, lanceolate or ensiform, often constricted near the middle. Wings normal. Legs usually long and slender. Males alate. Oviparous females apterous.

The *type* fixed by Passerini was *Aphis rosæ* Linnæus. The name *Siphonophora* proposed by Koch was correctly substituted by Passerini with *Macrosiphum*. Oestlund, not aware of Passerini's name, substituted *Nectarophora*, which consequently sinks as a synonym. The name *Macrosiphon* of Del Guercio is evidently in error.

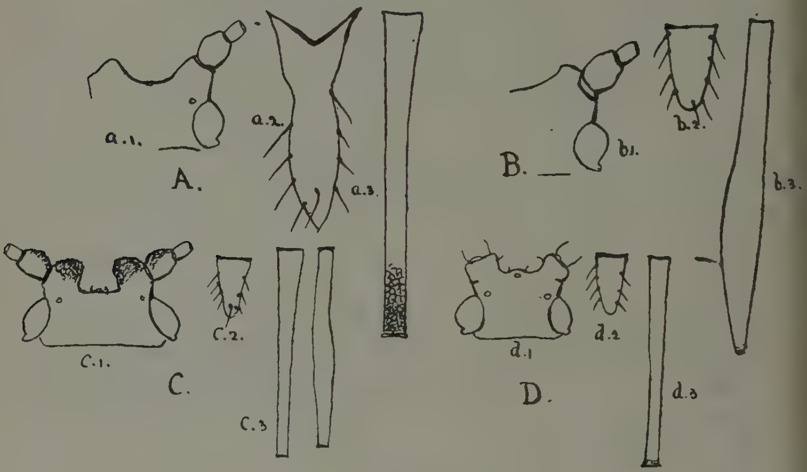

Fig. 39.

A. *Macrosiphum.* a1 head, a2 cauda, a3 cornicle.
B. *Amphorophora.* b1 head, b2 cauda, b3 cornicle.
C. *Myzus.* c1 head, c2 cauda, c3 cornicles.
D. *Illinoia.* d1 head, d2 cauda, d3 cornicle.

The genus has been sub-divided by Mordwilko into numerous genera, but these are not accepted here.

Many species previously placed in this genus are now known to belong to the genus *Myzus*, and have been removed, such as Buckton's *Siphonophora circumflexa.*

One of Buckton's species (*scropulariæ*) I have been unable to find. Some of Walker's many species may belong here, but it is difficult to say until they have been definitely identified.

List of British Species.

Macrosiphum rosæ Linnæus.
,, *jaceæ* Linnæus.
,, *sonchi* Linnæus.
,, *solidaginis* Fabricius.
,, *amygdaloides* nov.sp.
,, *cyparissiæ* Koch.
,, *olivatum* Buckton.
,, *taraxaci* Kaltenbach.
,, *granarium* Kirby.
,, *alii* Jackson.
,, *fragariæ* Walker.
,, *rubifolium* Theobald.
,, *rubiellum* Theobald.
,, *formicarium* Theobald.
,, *githargo* Theobald.
,, *tanaceti* Linnæus.
,, *tanaceticola* Kaltenbach.
,, *pisi* Kaltenbach.
,, *theobaldii* Davis.
,, *loti* Theobald.
,, *sileneum* Theobald.
,, *graminum* Theobald.
,, *phillipsii* Theobald.
,, *urticæ* Schrank.
,, *gei* Koch.
,, *centranthi* Theobald.
,, *lineatum* V. d. Goot.
,, *pelargonii* Kaltenbach.
,, *euphorbiellum* Theobald.
,, *corallinum* Theobald.
,, *hellebori* Theobald.
,, *kaltenbachii* Schouteden.
,, *rogersii* Theobald.
,, *dirhodum* Walker.
,, *tussilaginis* Walker.

Macrosiphum galiophagum Wimshurst.
,, *agrostemnium* Theobald.
,, *picridis* Fabricius.
,, *sisymbrii* Buckton.*
,, ? *scropulariæ* Buckton.

FOOD PLANTS OF *Macrosiphum.*

Alliaria officinalis	M. kaltenbachii Schou.
Allium porrum	M. alii Jackson.
Alsine sp.	M. jaceæ Linn.
Agrostemma githargo	M. githargo Theob.
,, ,,	M. agrostemnium Theob.
Agrostis vulgaris	M. granarium Kirby.
Apargia hispida	M. picridis Fabr.
,, *autumnalis*	M. picridis Fabr.
Artemisia lineata	M. lineatum V. d. Goot.
Arundo phragmitis	M. dirhodum Wlk.
Avena fatua and *sativa*	M. granarium Kirby.
Bidens cernua	M. rosæ Linn.
Bromus mollis	M. granarium Kirby.
,, *secalinus*	M. granarium Kirby.
Chrysanthemum segetum	M. sonchi Linn.
,, *spp.*	M. rosæ Linn.
Capsella bursa-pastoris	M. pisi Kalt.
,, ,,	M. granarium Kirby.
Carduus acanthoides	M. jaceæ Linn.
,, *crispus*	M. jaceæ Linn.
,, *lanceolatus*	M. olivatum Buckton.
,, *nutans*	M. sonchi Linn.
,, ,,	M. jaceæ Linn.
Centaurea cyanus	M. jaceæ Linn.
,, ,,	M. solidaginis Fabr.
,, *nigra*	M. jaceæ Linn.
,, ,,	M. sonchi Linn.
,, *nigrescens*	M. jaceæ Linn.
Centranthus ruber	M. rosæ Linn.
Chelidonium majus	M. gei Koch.
,, ,,	M. urticæ Schrk.

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* From an examination of Buckton's slide in the British Museum I should say his *sisymbrii* is only *picridis* Fabricius.

Cichorium intybum	M. sonchi Linn.
,, ,,	M. picridis Fabr.
Crepis biennis	M. sonchi Linn.
Dipsacus sylvestris	M. rosæ Linn.
Dactylis glomerata	M. granarium Kirby.
Euphorbia cyparissia	M. cyparissiæ Koch.
,, *sp ?*	M. euphorbiellum Theob.
,, *amygdaloides*	M. amygdaloides Theob.
Fragaria vulgaris	M. fragariæ Walker.
,, ,,	M. rogersii Theob.
Galium aparines	M. galiophagum Wims.
,, ,,	M. rubiellum Theob.
Glaucium luteum	M. gei Koch.
Geranium robertianum	M. urticæ Schrk.
Glyceria fluitans	M. granarium Kirby.
Genista tinctoria	M. pisi Kalt.
Geum urbanum	M. gei Koch.
Graminaceæ	M. granarium Kirby.
Hordeum murinum, etc.	M. granarium Kirby.
Hieracium sylvestris	M. sonchi Linn.
,, *pilosellæ*	M. picridis Fabr.
,, *murorum*	M. picridis Fabr.
,, *umbellatum*	M. picridis Fabr.
Holcus mollis	M. granarium Kirby.
Helleborus viridis	M. hellebori Theob.
,, *fœtidus*	M. hellebori Theob.
Humulus lupulinus	M. gei Koch.
Ulex europæus	M. pisi Kalt.
Lactuca muralis	M. muralis Buck.
,, *sp.*	M. sonchi Linn.
,, *sp.*	M. gei Koch.
Lathyrus sylvestris	M. pisi Kalt.
Lapsana communis	M. sonchi Linn.
,, ,,	M. kaltenbachii Schou.
,, ,,	M. tanaceti Linn.
Leontodon taraxaci	M. taraxaci Kalt.
Lotus corniculatus	M. loti Theob.
Malva sylvestris	M. pelargonii Kalt.
,, ,,	M. urticæ Schrk.
Nicotiana rustica	M. rosæ Linn.

Picris hieracioides	M. sonchi Linn.
Pisum spp.	M. pisi Kalt.
Polygonum persicariæ	M. granarium Kirby.
Pyrus malus	M. rosæ Linn.
Poa pratensis	M. granarium Kirby.
Rosa sp.	M. rosæ Linn.
,, ,,	M. gei Koch.
,, ,,	M. dirhodum Wlk.
Rhododendron	M. rosæ Linn.
Rubus fruiticosus	M. cyparissiæ Koch.
,, ,,	M. rubiellum Theob.
,, ,,	M. rubifolium Theob.
,, *idæus*	M. rubiellum Theob.
,, ,,	M. rubifolium Theob.
Ruta graveolenti	M. jaceæ Linn.
Sisymbrium officinale	M. sisymbrii Buck.
Serratula arvensis	M. sonchi Linn.
Stellaria graminea	M. gei Koch.
Spiræa ulmaria	M. gei Koch.
Scabiosa arvense	M. rosæ Linn.
,, ,,	M. jaceæ Linn.
,, ,,	M. solidaginis Fabr.
,, *columbaria*	M. rosæ Linn.
,, *succisa*	M. rosæ Linn.
,, ,,	M. cyparissiæ Koch.
Solanum tuberosum	M. gei Koch.
,, ,,	M. jaceæ Linn.
,, ,,	M. sonchi Schrk.
Sonchus oleraceus	M. jaceæ Linn.
,, ,,	M. sonchi Linn.
,, ,,	M. solidaginis Fabr.
,, *macrophyllus*	M. kaltenbachii Schou.
Solidago virgaurea	M. solidaginis Fabr.
Silene inflata	M. sileneum Theob.
Tanacetum vulgare	M. tanaceti Linn.
,, ,,	M. tanaceticola Kalt.
Taraxacum densleonis	M. taraxaci Kalt.
Trifolium hybridum	M. pisi Kalt.
,, *procumbens*	M. theobaldii Davis.
,, *pratensis*	M. pisi Kalt.

Trifolium repens	M. pisi Kalt.
,, *scabrum*	M. pisi Kalt.
Triticum spp.	M. granarium Kirby.
Tussilago farfaræ	M. tussilaginis Wlk.
Urtica dioica	M. urticæ Schrk.
Valeriana officinale	M. centranthi Theob.
Watsonia sp.	M. gei Koch.
Zea mays	M. granarium Kirby.

KEY TO BRITISH MACROSIPHUM.

Alate viviparous females.

I. Cornicles markedly reticulate at apices.

A. Cornicles black.

B. Cauda green.

Abdomen shiny green, with black lateral spots; segment iii. with 42 to 58 sensoria. *rosæ.*

Abdomen green to dull yellow brown: 4 to 5 black lateral spots and 3 or more pairs of black elongate spots below them. Cauda pale green or pale yellow green; iii. with 9 to 18 sensoria over more or less half the length. Cauda about equal to cornicles. *granarium.*

Very similar but cauda shorter than cornicles and iii. with 24 to 28 sensoria. *alii.*

Green, some dark indistinct patches on abdomen; iii. with 22 to 25 sensoria on three-quarters of the length. *rubifolium.*

Green to yellow, with black lateral spots and paired lines; iii. with 13 to 20 sensoria more or less in a line. *rubiellum.*

BB. Cauda yellow or pallid.

Bright shiny green, no lateral spots, cauda yellow. *cyparissiæ.*

Deep reddish brown; 4 black lateral spots and small black tubercles; hairy; cauda long, yellow; iii. with 40 to 45 sensoria. *olivatum.*

Reddish-fawn. Cauda yellow. *githargo.*

Reddish brown, a darker patch above cornicles. Cauda short, yellow. *tanaceti.*

Rich shiny chestnut to red brown; black lateral spots. Cauda pale; iii. with 48 to 55 sensoria over whole length; tuberculate. *sonchi.*

Ochreous-brown, edges paler; 3 large obscure spots each side of abdomen; very like *sonchi*, but smooth. *sisymbrii.**

Abdomen green; 4 black spots each side; 2 large black spots caudad of cornicles, then a smaller pair. Head and thorax very dark. Cauda yellowish-red; iii. with 65 to 80 sensoria. *fragariæ.*

Abdomen garnet-red to dull red, no marks or tubercles; iii. with 31-35 sensoria; iv. with 0 to 4. *muralis.*

BBB. Cauda black.

Shiny metallic brown. Cauda long; iii. with 65 to 80 sensoria over whole length. *jaceæ.*

Reddish-brown; black tubercles with short hairs arising from same. Cauda rather short; iii. with 50 to 52 sensoria. *taraxaci.*

Abdomen deep red; iii. with 32 to 40 sensoria over whole length. *solidaginis.*

AA. Cornicles darker than body, deep olive green to brown, or black with green base. Never all deep black.

Abdomen green to rich green, shiny. Cauda yellow to yellow-green; iii. with 14 to 17 sensoria over three-quarter length. *amygdaloides.*

Green. Cauda pale green, long; iii. with 17 to 18 sensoria of unequal size, along one side, not quite to apex. *hellebori.*

Bright green body; 3 dark spots each side before cornicles; traces of smaller ones above them; iii. with 20 to 28 sensoria. *centranthi.*

AAA. Cornicles pale green, apices dusky. Cauda green.

Green to dark green; iii. with 14 to 20 sensoria over more than half length of segment. *gei.*

Green; abdomen with dark green lines; iii. with 25 to 33 unequal sensoria. *lineatum.*

Bright green, shiny; iii. with 3 sensoria at base. *galiophagum.*

2. Cornicles with reticulation over most of length. Abdomen pale, with dark lateral spots and longish hairs; iii. with 20 sensoria over two-thirds length. Cauda pale. *formicarium.*

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* This is apparently *picridis* Fabricius, which will be described in the appendix.

3. Cornicles with very few reticulations.

Green body; 3 pairs small dark lateral spots; iii. with 20 to 32 sensoria to tip. *urticæ.*

Green body; iii. with 13 to 25 sensoria, no dark lateral spots; 4 pairs of caudal hairs. *pelargonii.*

4. Cornicles with no reticulation (imbricated).

I. Cornicles and cauda black.

Green to dark green; abdomen with 4 irregular transverse bands, sometimes represented by 4 pairs of elongate transverse lateral spots; 3 large black spots each side, a large black patch behind each cornicle. *kaltenbachii.*

II. Cornicles and cauda green.

Green; iii. with 12 to 16 sensoria, not reaching apex. *pisi.*

Green; iii. with 5 to 6 sensoria on basal half. *loti.*

Green to yellow-green, a darker green dorsal line or a row of dusky-green spots; iii. with 23 to 32 sensoria. *dirhodum.*

III. Cauda and cornicles yellow.

a. Cornicles dark at base and apices.

Green, with narrow rows of black bands along dorsum and a row of black spots each side. *tussilaginis.*

aa. Cornicles all yellow, thin. Abdomen bright yellow, with 4 transverse stripes which increase in breadth as they approach cauda, 2 much broader patches above cornicles. Cauda yellow. *scropulariæ.*

Apterous viviparous female.

1. Cornicles markedly reticulate apically.

A. Cornicles black.

B. Cauda yellow.

Green or red; segment iii. with 12 to 23 sensoria. *rosæ.*

Rich chestnut to deep reddish brown; iii. with 17 to 18 sensoria on basal half. *sonchi.*

Bright green with deeper green dorsal stripe. *cyparissiæ.*

Bright garnet red. *tanaceticola.*

Rich ochreous brown, very shiny, small black tufted tubercles. iii. with 39 to 43 sensoria. *sisymbrii.**

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* Apparently *picridis* Fabricius, which shows from 43 to 48 sensoria on iii. in the few specimens I have seen.

Shiny brown, now and then with a dull red line; iii. with 25 to 28 sensoria. Cauda pale yellow, 4 hairs each side. *muralis.*

BB. Cauda green, yellow or greenish-yellow.

Green; iii. with 3 to 4 sensoria near base. *amygdaloides.*

Segment iii. with 0 to 3 sensoria. Green to yellow-green with darker mottlings and black lateral spots, now and then. *granarium.*

Green; segment iii. with 14 to 17 sensoria not quite reaching apex. *rubifolium.*

Green to yellow; iii. with 1 sensorium. *rubiellum.*

Head and pronotum deep brown, remainder green. Cauda pale green to pale reddish yellow. Segment iii. with 8 to 12 sensoria on black basal area. *fragariæ.*

Cornicles thick. Cauda pale, 6 hairs one side, 7 to 8 the other; iii. with 45 to 50 sensoria of unequal size. Anal plate very dark. *phillipsii.*

BBB. Cauda black.

Dark brown, with brassy lustre; iii. with 25 to 28 sensoria on basal half. *jaceæ.*

Deep brown, with black tubercles; iii. with 30 to 35 unequal sized sensoria on basal half. *olivatum.*

Coffee brown and metallic; iii. with 20 to 30 sensoria on basal half. *taraxaci.*

Deep red to reddish brown; iii. with 25 to 28 sensoria on basal half. Cauda black to deep reddish black. *solidaginis.*

AA. Cornicles green to deep green.

Green; iii. with 2 to 4 sensoria. Cauda with 5 hairs one side, 6 the other. *gei.*

Pale green; iii. with 4 sensoria in a line. Cauda 4 hairs each side. *sileneum.*

Green; iii. with 3 to 5 sensoria. Apices of cornicles very dark. Cauda green with 6 pairs of hairs. *centranthi.*

Green; iii. with 5 to 8 sensoria. Cauda with 4 hairs one side, 5 the other. *hellebori.*

Green, shiny. Cauda green, 3 hairs each side. *galiophagum.*

Green, body with deeper green lines and markings; iii. with 5 to 12 unequal sized sensoria. Cauda green, very large, numerous fine hairs. *lineatum.*

Pink, semi-transparent ; iii. with 2 oval sensoria. Cauda pale pink ; 4 hairs each side and 3 dorso-apical. *euphorbiellum.*

Bright pink ; legs, cornicles and antennæ yellow. Cauda green, 5 hairs each side ; iii. with 4 to 5 sensoria. *corallium.*

2. Cornicles with a few apical reticulations.

Cornicles green ; cauda long, pale, yellow ; iii. with 2 to 4 sensoria. *kaltenbachii.*

Pale yellow and green. Cauda pale, with 4 pairs of hairs ; iii. with 1 sensorium. *pelargonii.*

3. Cornicles non-reticulate.

A. Cauda green.

Green, 6 dark spots each side of abdomen or not ; iii. with 3 sensoria near base. Cauda green ; 4 hairs one side, 5 the other. *pisi.*

Pale green ; antennæ thicker than in *pisi* ; no sensoria on iii. *theobaldi.*

Same colour as *pisi* ; cornicles relatively shorter and thinner ; cauda shorter ; iii. with 1 or 3 sensoria ; 3 hairs each side of cauda. *loti.*

Green ; iii. with 8 sensoria in a line ; 2 rows of black spots on abdomen on anterior region. Cauda long, pale yellow-green. *rogersii.*

Green to yellow-green ; 1 to 2 dark green wavy lines down dorsum. *dirhodum.*

Pale translucent green, no darker dorsal lines. *graminum.*

Pale ashy, almost white and transparent. *scropulariæ.*

AA. Cornicles yellow, dark at bases and apices. Cauda pale yellow.

Brown to pale brown ; head dark ; 5 dark lateral tubercles and rows of transverse hairs, some arising from dark spots. *tussilaginis.*

MACROSIPHUM ROSÆ Linnæus.

Aphis rosæ Linnæus.
Siphonophora rosæ Koch.
Aphis dipsaci Schrank.
Siphonophora scabiosæ Buckton, etc.
Macrosiphum rubifolium Theobald (?)

Linnæus. Syst. Nat. II, 734, 9 (1735); Fn. Suec., 982; Fabricius. Sp. Ins., II. 387, 25 (1781); Ent. Syst. IV., 217, 30 (1794); Syst. Rhyng., 298, 30 (1803); Reaumur, Ins., III., t. 21, figs. 1-4 (1736); De Geer Ins., III., 65, 10 t. 3, figs. 1-4 (1773); Rossi, Fn. Etrusc., 262, 1386 (1790); Götz, Ent. Beitr., II, 296, 9; Sulzer, Ins. I., 12, fig. 79 (1761); Schrank, Fn. Boica, III, 117 (1801); Harris, Ex. 66, F. 18, figs. 1-3 (1776); Bonnet, Hist. Nat., I., 48 (1779); Latreille, Gen. Ins., III., 173 (1808); Lamarck, Anim. sans Verteb, 2^{me} Ed. IV., 122; Westwood, Mag. Nat. Hist., VI., 492; Haliday, Ent. Mag., II. 78; Burmeister, Handbk. Ent., II., 94, 2 (1833); Mosley, Gard. Chron., I., 628 (1841); Fonscolombe, Ann. Soc. Ent. Fr. X., 168-8 (1841); Kaltenbach, Mono. Pflanz., I., pp. 3-10 (1843); Blanchard Ins., 206-11 (1845); Amyot. Hist. Nat. Hemipt., 609, 1 (1843); Walker, Ann. Mag. Nat. Hist., II., Se. 2, 192-45 (1848); Koch, Die Pflanzenläuse, 178, figs., 245-246 (1855); Buckton, Mono. Brit. Aphid., I., 103, pls. I. and II. and IV., figs. 1, 2, 3 (1875); Theobald, Journ. Eco. Biol., VIII,. 55, fig. 1 (1913); Russell, Bull. 90, U.S. Dept. Agri. (1914); Essig, Pomona Journ. Ent., III., 3, 500 (1911); Oestlund, Aphid. Minn., 81 (1887); Fullaway, Ann. Rept. Haw. Exp. Sta., 25 (1910); Schouteden, Aphid Belg. 240 (1905); Matsumura, Journ. Coll. Agri. Tohoku Imp. Univ., VII., 361 (1917); Theobald, Journ. Eco. Biol., VIII., 61, fig. 4 (1913); Enemies of the Rose, Nat. Rose Soc., 78 (1925); Blanchard, Physis., V. 20., 187, fig. 1 (1922); Takahashi, Aphid. Formosa, II., p. 13 and 71 (1923); Moreira, Bd., 2, 24; Min. Agri. Inst. Biol. d. Agri. Brasil (1925).

Apterous viviparous female. Head, thorax and abdomen green or reddish. Cornicles black, long, slightly expanding at their bases, usually slightly curved, but by no means always; the apices with hexagonal reticulations, more or less irregular; remainder imbricated. Cauda yellowish to pale yellowish-green; large; ensiform, with about 8 lateral hairs and two more or less prominent median dorso-apical ones. Antennæ very long and arising from prominent frontal tubercles; segment i. much larger than ii.; iii. longer than iv., with 12 to 23 sensoria on basal region of two sizes; iv. about two-thirds of iii.; v. slightly shorter than iv.; vi. about as long as iv. + v. Legs long, same colour as body, apices of femora and tibiæ dark, almost black;

tarsi black. Eyes deep red to reddish black. The red variety has exactly the same structure of the antennæ and cornicles as the green.

Length 2.5 to 3 mm.

Alate viviparous female. Head, pronotum, scutum and thoracic lobes black, also scutellum; a narrow green band between head and pronotum, remainder of thorax dark green. Abdomen shiny, bright green, 3 large black spots each side; behind the cornicles a black patch at their base and a black crescent-shaped mark in front of them; 2 dark spots behind the cornicles and sometimes a dark patch on the last segment. Antennæ very long, segment iii. with 42 to 58 round sensoria over nearly its whole length; iv. shorter than iii.; v. about as long as iv.; vi. shorter than iv. + v.; some of the hairs are capitate. Legs varying from yellowish-green to pale yellowish-green, with broad black areas on the apices of the femora and tibiæ; tarsi black. Cauda long, green. Cornicles long and thin black; the apices reticulate, remainder imbricated. Eyes red. Wings with yellow insertions and cubitus; stigma and veins pale brownish.

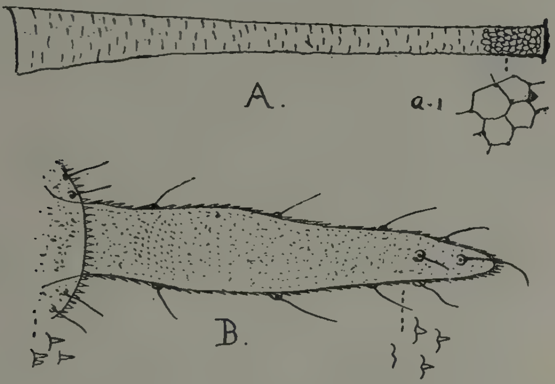

Fig. 40.—*Macrosiphum rosæ* Linn.
A, Cornicle; B, Cauda of alate viviparous female.

Length 3 to 3.5 mm.

Oviparous female. Apterous, rusty red. Antennæ short, about half the length of the body. Eyes red. Cornicles black shorter in proportion than in the viviparæ. Posterior tibiæ with many sensoria. Legs dusky to black.

Length 1.2 to 1.5 mm.

Male. "Alate, black; abdomen dark yellowish-green; most of the disc is black and there is a row of black spots on each side; the feelers are much longer than the body; the mouth and the nectaries are dull yellow with black tips; the latter nearly one-quarter the length of the body; the thighs are pale yellow towards the base; the shanks, with the exception of the tips are dark yellow; the wing ribs and the rib-veins are pale yellow; the wing brands and the veins are brown.

Whilst a pupa it is bright red and shows a striking contrast to the pale velvet-like oviparous female of *Aphis dirhoda*, which sometimes swarm on the roses in late autumn" (Walker). I have never found the male.

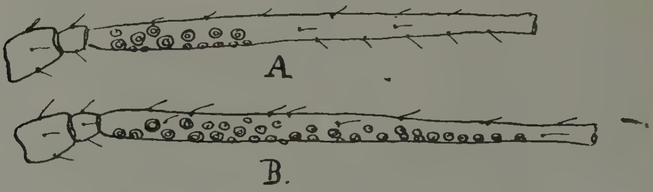

Fig. 41.—*Macrosiphum rosæ* Linn.
A. Apterous; B. Alate female, base of antennæ.

Food Plants. Roses of all kinds, both wild and cultivated; Red Valerian (*Centranthus ruber*); Teazles (*Dipsacus sylvestris* and *D. pilosus*); Bidens (*Bidens cernua*); *Scabiosa arvensis*, *S. succisa* and *S. columbaria*; Apple (*Pyrus malus*); Tomato, 14 vii. 13; and Rhododendrons. Rubus? (Takahashi).

Localities. General over all Great Britain and Europe; Egypt (Willcocks and Theobald); Japan (Matsumura and Takahashi); Argentine, Buenos Aires (Blanchard); Brazil (Moreira); Java (V. d. Goot, 1917).

Natural Enemies. *Aphidius rosæ*; *Allotria erythrocephala*; *Ceraphon clavata* and *Cyrtogaster vulgaris*. It is also preyed upon by the Syrphids, *Syrphus balteatus* and *Catabomba* *pyrastri.* Several species of Lady Birds and their larvæ feed on it, notably *Adalia bipunctata* and some *Hemerobii.* Sparrows and chaffinches also eat them in large numbers.

Observations. The winter is passed in two stages, namely as ova and as apterous females. The eggs are laid in November and even December. At first they are pale dirty yellow, but in a few days become shiny black. When fresh the ova are covered with a glutinous slime by which they are held firmly on to the plant. A single female lays from four to six ova. I have not found the male, so append Walker's description. Buckton figures what he considered the male (Mono. Brit. Aphid., Pl. III., fig. 4) and says that the general colour is reddish-green with very long wings, long black cornicles and dark marks on the thorax and abdomen. In warm winters I find that asexual reproduction may go on all the time, especially on roses, against a sheltered wall. Alatæ occur in June and fly from bush to bush and in an incredible time form large colonies on the shoots and frequently smother them, and this may go on throughout the whole season. There

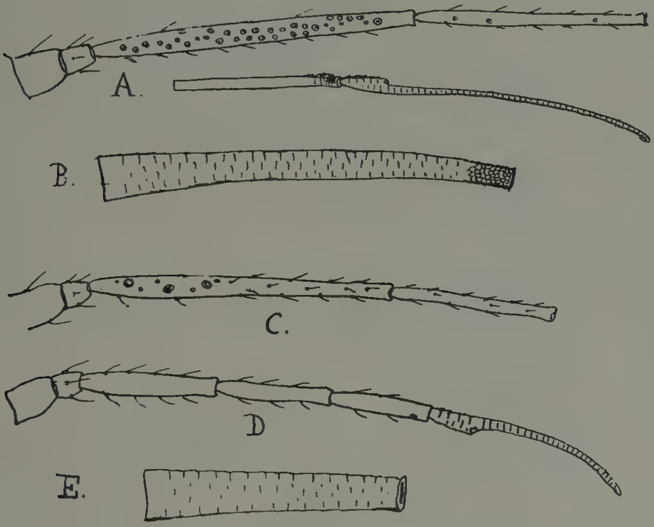

Fig. 42.—*Macrosiphum rosæ* on Scabious.
A. and B. Alate ♀; C. of apterous ♀; D. and E. Cornicle of larva.

is also a migration from the Teazle, where eggs are also laid. Teazles growing in a spinney near my home I found covered with alate females I could not separate from *rosæ*, and in July they all left the Dipsacus and were traced to the roses. It has been called *dipsaci* by Schrank. This insect is subject to much variation in colour, some are red, others pink and with dark markings more or less distinct. In some the markings may be entirely absent ; green is, however, the usual colour. Walker gives many varieties and there is no doubt that these could easily be multiplied, but I see no reason for so doing, as the characters of the antennæ and cornicles are conclusive. Walker says that when on the Teazle they are frequently attended by ants, *Formica rufa*, and on the Rose by *Formica nigra*. I have found several species of ants with them on both host plants. On one occasion I found it on Tomatoes, but although it was breeding there it did not survive long. Dr. Durham also observed it breeding on Apple trees at Hereford in July.

The insects from Scabious described by Buckton and others as *Macrosiphum scabiosæ* Schrank, are only *rosæ*. All my specimens certainly are, and Mr. F. Laing tells me that Buckton's specimens in the British Museum are all *rosæ*. Schrank's *scabiosæ* is a true Aphis.

Buckton and Lefroy record this from India, in error, the species on roses being distinct and described by Das (Mem. Ind. Mus., IV., 1918) as *Macrosiphum rosæiformis*. Buckton's specimens are in the British Museum.

Buckton described a variety as *glauca*, but there is no slide of it in the Buckton Collection in the British Museum Mr. Laing informs me.

Takahashi refers with a query to this species on *Rubus* in Japan. It may be that my *rubifolium* is only a variety of *rosæ* but at present I am leaving it distinct. It agrees with Takahashi's *M. rosæ ?* from *Rubus* in Japan.

MACROSIPHUM GRANARIUM Kirby.

Aphis granaria Kirby.
Aphis hordei Kyber (nom. nud.).
Aphis cerealis Kaltenbach.
Aphis avenæ Walker.
Bromaphis Amyot.

Siphonophora cerealis Koch.
Siphonophora granaria Buckton.
Nectarophora granaria Oestlund.
Macrosiphum granarium Schouteden.
Macrosiphum avenivorum Kirkaldy.
Macrosiphum miscanthi Takahashi.

Kirby, Trans. Linn. Soc., IV., 4, 238 (1798) ; Kyber (1815) ; Mag. Ent. (Germar), Vol., 1, 2, 211 (1798) ; Kaltenbach, Mono. Pflanz, 16 (1843) ; Curtis, Journ. Roy. Agri. Soc. Eng., V., 6, 504 (1846) ; Walker, Ann. Mag. Nat. Hist. Se. 2, V., 3, 45 (1849) ; Amyot, Ann. Soc. Ent. Fr., Se. 2, V., 479 (1847) ; Curtis, Farm Insects, 289 (1883) ; Koch, Mono. Pflanz, 186, figs. 255, 256 (1855) ; Buckton, Mono. Brit. Aphid, I., 114, pl. 6 (1876) ; Oestlund, Geol. and Nat. Hist. Surv., Minn. Bull, 4, 82 (1887) ; Schouteden, Ann. Soc. Ent. Belg., 45, 114 (1901) ; Kirkaldy, Entomologist, XXXVIII, 132 (1905) ; Theobald, Journ. Eco. Biol., VIII., 58, figs. 2 and 3 (1913); Pergande, U.S. Dept. Agri. Div. Ent. Bull., 44, 5 to 23, figs. 1 to 4 (1904) ; Sanderson, Ent. News, 17, 327 (1906) ; Webster and Phillips, U.S. Dept. Agri. Div. Ent. Bull., 110 (1912) ; Phillips, Journ. Agri. Resc., VII., 11, 463 to 480, pls. 33, 44 (1916) ; Matsumura, Journ. Col. Agri. Tohoku Imp. Univ., VII., 360 (1917) ; Theobald, Bull. 2 S.E.A. Coll. 5, fig. 1 (1923) ; Das, Mem. Ind. Mus., IV., 4, 162 (1918). Takahashi, Aphid Formosa, I., 8 (1921) and II., 14 (1923).

Apterous viviparous female (Stem Mother). Green to dark apple green above, darker below, some almost silvery below ; head pale greenish-brown to brown. Eyes red to deep red-brown. Antennæ dark olive green to brown, except at base. Legs dark, except for green base of femora ; tibiæ paler greenish-brown, apex dark. Cornicles black. Cauda pale green. Antennæ shorter than body ; segment i. larger than ii. ; iii. considerably longer than iv. ; iv. a little shorter than v. ; vi. about as long as iii. ; iv. to vi. imbricated. Cornicles reticulate at apices, about as long as antennal segment iii. Cauda with six lateral hairs and one sub-apical. Rostrum green, apex dusky to black ; reaching to or just beyond second coxæ.

Length 2.5 mm.

Apterous female (second generation). Green to yellowish-green, with sometimes darkened mottlings and darker apices.

Head yellow, pale yellowish-green to yellowish-brown; some show dark spots on each side of body and between cornicles. Cornicles black, moderately long, cylindrical and expanded basally. Cauda long, pale yellowish-green, curved upwards, somewhat contracted in middle. Legs yellow to yellowish-green; apical half of femora, apex of tibiæ and the tarsi black. Eyes deep red to brown. Rostrum yellow, apex dark, reaching past second coxæ. Antennæ dark except at base; segment i. larger than ii.; iii. longer than iv.; iv. a little longer than v.; vi. a little longer than iv.+v.; 0 to 4 sensoria base of iii., a few scattered hairs, some slightly capitate. Cornicles reticulate at apices. Cauda about two-thirds length of cornicles, with 3 hairs each side and 1 sub-apical.

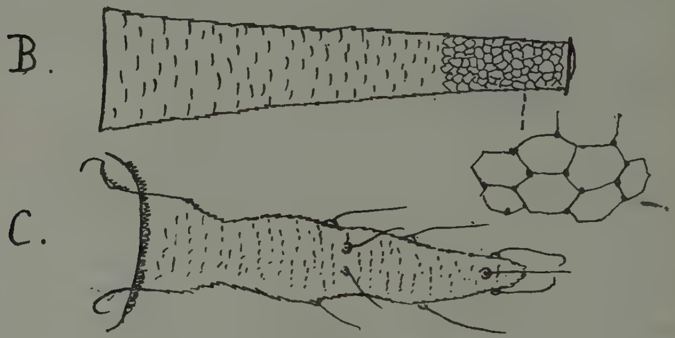

Fig. 43.—*Macrosiphum granarium* Kirby.
Alate ♀; B. Cornic'e; C. Cauda.

Length 2.3 to 2.9 mm.

Alate viviparous female. Green, dull yellowish-green to dull yellowish-brown; thorax darker, with black or brown lobes or yellowish-green with dark lobes, and scutellum or pronotum with a dark bar or spot. Head olive-green to brown or yellowish. Eyes deep red to almost black. Antennæ black, longer than body; two basal segments paler. Cornicles black. Cauda yellow to green. Legs as in apterous female. Segment i. of antennæ larger than ii.; iii. longer than iv., with 9 to 18 round sensoria extending for more or less half the length of the segment; v. shorter than iv.; hairs either simple or showing faint traces of apical swelling. Rostrum reaches second coxæ, rarely beyond.

Abdomen green with 4 to 5 black lateral spots in front of the cornicles and below these may be three or more pairs of black elongate spots. Cauda pale green or yellow, long, constricted at base. Cornicles reticulate for about one-third of their length. Wings with green insertions, varying to yellowish; stigma pale brown, also veins; much longer than body.

Length 2 to 2.6 mm.

Male. Alate. Reddish-brown with black markings and spots. Antennæ black, longer than body; segment i. longer than ii.; iii. a little longer than iv.; iv. a little longer than v.; vi. a little longer than iv. + v.; iii. with 35 to 55 sensoria over its whole length; iv. with 10 to 25; v. with 10 to 15, mostly on basal half. Cornicles reticulate at apices.

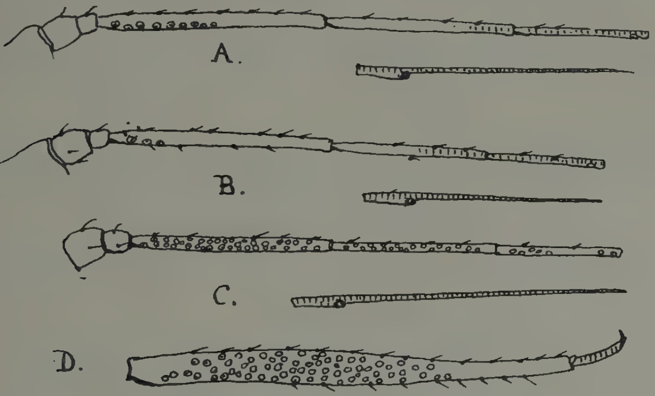

Fig. 44.—*Macrosiphum granarium* Kirby.
A. Antenna of alate female. B. of apterous female. C. of male.
D. Hind tibia of oviparous female.

Length 2.1 to 4.2 mm.

Oviparous female. Apterous. Green, yellowish-green to deep green. Head paler and duller. Antennæ deep brown. Legs as in other forms. Abdomen with small black spots on each side. Hind tibiæ slightly broadened, with numerous sensoria, except towards the apex.

Length 1.5 to 1.9 mm.

FOOD PLANTS. Wheat (*Triticum*); Barley (*Hordeum*); Oats (*Avena*); *Bromus mollis*; *Dactylis glomerata*; *Secale* *cereale*; *Triticum sativum*; *Hordeum murinum*; *Poa* and other grasses. Walker gives *Glyceria fluitans* and *Polygonum persicaria*. Phillips records from America the following: *Agrostis vulgaris* (*alba*); *Bromus secalinus*; *Dactylis glomerata* and *Poa pratensis* (Riley); *Phleum pratense; Zea Mays* (Webster); *Elymus sp.* (Pergande); *Bursa bursa-pastoris*; *Syntherisma sanguinale*; *Echinochloa crus-galli*; *Hordeum pusillum*, and during a series of experiments it bred and throve on *Bromus commutatus* (?) [*racemosus*]; *B. secalinus*; *Elymus sp.*; *Festuca duriuscula* (*ovina*); *F. heterophylla*; *F. pratensis* (*elatior*); *F. tectorum*; *Juncus tenuis*; *Lolium italicum, Poa compressa, P. pratensis*. It has also bred freely in confinement upon *Eleusine indica*. *Miscanthus* (Takahashi); *Paspalum sp., Panicum sp.* (V. d. Goot); Rice (Essig and Kuwana) in Japan.

LOCALITIES. All over Europe and most of America; Japan (Matsumura, etc.); Java (V. d. Goot); Brit. E. Africa (Theobald).

Observations. This Aphid now and again becomes a serious pest in wheat and other corn. The eggs are laid on grasses and autumn sown cereals; they hatch out in March and rarely April. On one or two occasions they have been found in February. Alate broods appear in June and many of these fly from various grasses to corn, where they go on reproducing by parthenogenesis until late October; that is if not destroyed by harvesting or by the many parasites that attack them. The sexuales occur mainly on wild grasses and self-sown corn around the headlands and by the wayside. By the time the corn is coming into ear, the insects are found clustering in and around the ears and go on sucking the young grain until it becomes too hard. They then become nymphæ and the alatæ fly off to grasses, etc., where they produce the sexual females, and possibly, some males, but most of the males fly to them from elsewhere. Pink forms now and then occur.

Synonymy. Although Kirby's original description of the grain Aphid is very meagre, there is no doubt that this is the insect he was dealing with and also Curtis in his classic "Farm Insects." Buckton also described the same insect. Walker's *Aphis avenæ* is the same. Kaltenbach's *cerealis* has been considered distinct by Pergande, but the characters by which he separates it are only those one can see in any series bred from the same parent; the absence or presence of the abdominal markings being as far as I can see of no diagnostic value. Kirkaldy considered Buckton's *granaria* not to be the same as Kirby's, and so he renamed it *avenivorum*, which has consequently to sink as a synonym. Pergande separated *granaria* and *cerealis* on account of the abdominal maculations, the comparative length of the antennal segments, the cornicles and the last fork of the wings by the measurement of the wings by tenths. None of these characters seem to me to hold good. *Cerealis*, he says, has an unadorned abdomen, and the antennæ and cornicles are constantly shorter; *granarium* has also at times an unadorned abdomen. Del Guercio, quoted by Phillips, says: " Your specimens have the antennæ a little longer than the body, whilst in our form, at least those of Italy and of the European basin of the Mediterranean, the antennæ are a little shorter than the body." Both occur in Britain.

Koch transferred this insect to his genus *Siphonophora* in 1855; Oestlund to his *Nectarophora* in 1887, and Schouteden to *Macrosiphum* in 1901, in which genus it still stands.

NATURAL ENEMIES.

Although it is not controlled at all in Britain by natural enemies, it is frequently attacked by Chalcids and most of these parasitised forms appear brownish or deep brown in colour, or as Buckton describes a rich sienna brown. The pupæ show this most of all. Buckton records *Ephedrus plagiator* (?) as attacking them, and *Ceraphron carpenteri* Curt., attacking the latter parasite. It is also preyed upon by *Adalia bipunctata* and by some predaceous mites. Phillips records a number of parasites in America including eight Coleoptera, three Diptera and eight Hymenoptera, some of which are secondary and not primary parasites.

It is also badly attacked by Fungoid Enemies, especially in the North of England.

MACROSIPHUM ALII Jackson.

Aphis alii Lichtenstein (n.n.).

Scottish Naturalist, p. 83 (1918).

Alate viviparous female. Head brown; antennæ dark brown, longer than body, segment iii. with 16 to 28 sensoria in a single row on outer side along basal two-thirds, those nearest the base a little smaller and closer together than the apical ones, which are placed futher apart ; segment iv. about two-thirds length of iii., without sensoria ; v. shorter than iv., a single normal sensorium near apex ; vi. twice as long as v., with a conspicuous rhinarium surrounded by a group of 3 to 5 small sensoria. Sensoria on iii. with a single contour ; that on v. with a double contour, as has the rhinarium. Each antennal segment has a few scattered hairs, which are short, thick and blunt, almost capitate at the extremity. Pronotum olive green, in some specimens tinged with brown, meso- and meta-notum light reddish chestnut ; the thoracic lobes dark brown. Abdomen dull green. Cornicles dark brown, rather short and thick, constricted beyond the middle but widening again at the apex. The basal portion is imbricated, the imbrication extending a little beyond the middle of the length of the cornicle ; the remaining apical portion is reticulate. The cauda is elongated, about three-quarter length of cornicles ; with six long

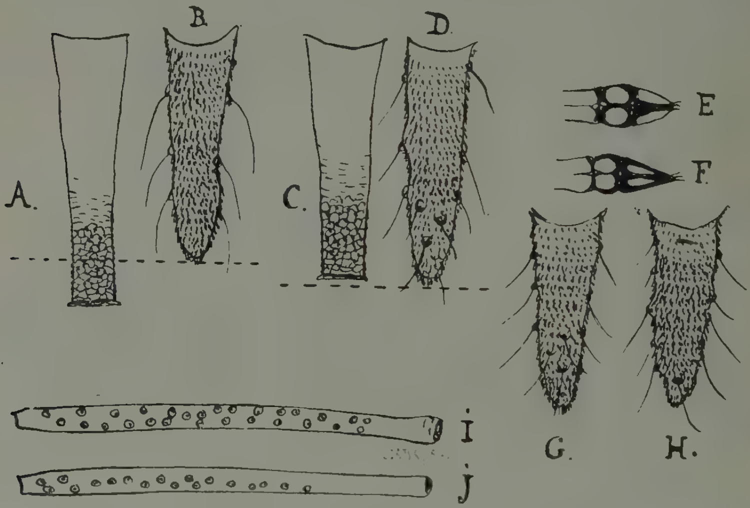

Fig. 45.—*Macrosiphum alii* and *M. granarium.*
A. B. Cornicle and Cauda of apterous ♀ *alii.*
C. D. Cornicle and Cauda of apterous ♀ *granarium.*
E. apex of rostrum of *alii* ; F. of *granarium.*
G. Cauda of alate *alii.* H, Cauda of alate *granarium.*
I. ant seg. iii. of *alii* ; J. of *granarium.*

hairs on one side, four the other. Legs ochreous, apices of femora and tibiæ and the tarsi dark brown. Rostrum not reaching base of second coxæ.

Length 2 to 2.3 mm.

FOOD PLANT. Leeks (*Allium porrum*).

LOCALITY. Swordale, Evanton, Ross-shire, N.B. (D. Jackson).

Observations. Miss Jackson found several alatæ of this insect on Leeks on August 5th, 1917. Each female had produced many young on the leaves; she was, however, unsuccessful in rearing them. Lichtenstein (Les Pucerons. Mono d'Aphidiens) in Flora des Aphidiens, 78, Cap. IV., records an Aphis on *Allium* as *Aphis alii*, but did not describe it. Baker thinks that this is only *M. granarium*. The figures given show the differences in fresh specimens, and in view of these differences I have kept them distinct here.

MACROSIPHUM RUBIFOLIUM Theobald.

Entomologist, L., 78, 24 (1917).

Apterous viviparous female. Green. Antennæ and cornicles dark. Legs with much dark coloration. Antennæ longer than body; segment i. larger than ii., several hairs near apex, forming a more or less prominent tuft; segment iii. longer than iv., with 14 to 17 sensoria not spreading to the apex and with stiff capitate hairs; iv. and v. about equal, with simple hairs; vi. long. Eyes

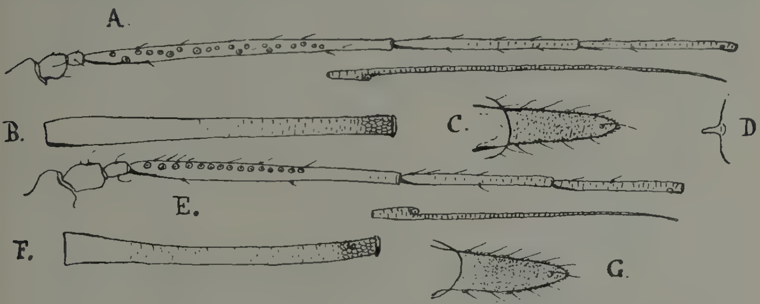

Fig. 46.—*Macrosiphum rubifolium* Theobald.
A. Antenna; B. Cornicle; C. Cauda of Alate ♀; D. Thoracic tubercle; E. Antenna of Apterous ♀; F. Cornicle; G. Cauda.

dark. Rostrum green, apex dark, reaching to base of third coxæ. A small pale lateral tubercle each side of pronotum and two small ones each side between second and third legs. A few prominent hairs on abdomen and head. Cornicles dark, very long, more than one-third length of body, curved outwards and projecting well beyond the cauda; apex reticulate; in some the cornicles are deep brownish-green, paler just at base, in others quite black. Cauda pale green to dusky green, with six pairs of hairs, spinose, about one-quarter length of cornicles, acuminate. Legs long, green, apices of femora dark, most of tibiæ darkened, especially at apices; tarsi dark; femora and tibiæ hairy, especially the latter towards their apices.

Length. 2.8 to 3 mm.

Alate viviparous female. Green; thorax dark. Antennæ, cornicles and most of legs dark; some dark markings on abdomen. Antennæ longer than body; segment i. considerably longer than ii.; iii. longer than iv., with 22 to 25 sensoria spread over about three-quarters of its length; iv., a little longer than v.; vi. about as long as iv. + v.; hairs simple. Rostrum dark at the apex; hairy; reaching to about third coxæ. Cornicles black, very long and cylindrical, apex reticulate, remainder imbricated. Cauda green, about one-sixth the length of the cornicles, with apparently four pairs of lateral hairs, spinose. Legs long and rather thin; base of femora green, apex black; tibiæ dark, especially at the apex; tarsi dark; femora and tibiæ hairy; especially the apex of the tibiæ. Wings much longer than the body; venation normal.

Length 2 mm.

FOOD PLANTS. Bramble (*Rubus fruticosus*), and Raspberry (*Rubus idæus*).

LOCALITIES. Wye (14 vii. and 22. viii. 15, and 17, viii. 16); Worthing (22 vii. 21); Cambridge (11 viii. 20); Little Hadham (7 vi. 19); Ventnor (29 vi. 13).

Observations. I first found this species at Ventnor and later at Wye in company with *Amphorophora rubi* Kalt. on the leaves of Brambles and at first mistook it for *M. rubiellum* Theob. It differs, however, in the sensoria on the antennæ in both apteræ and alatæ and in the very long cornicles and relatively short cauda. Later I found it on Raspberries. It bears such a strong structural resemblance to *M. rosæ* that it is quite likely only to be a variety of the common Rose Aphid. Further material is wanted to settle this point.

Macrosiphum rubiellum Theobald.

Journ. Eco. Biol., VIII., 147-55, figs. 55-57 (1913).

Alate viviparous female. Head brown to very deep brown. Pronotum brownish, with two dark spots. Thoracic lobes deep brown, a deep brown spot in front of each wing insertion; two black curved lines behind; ground colour of thorax green to deep green or olive green. Abdomen green to almost yellow, with black lateral spots, and paired lines on the abdomen; four pairs of lateral papillæ. Antennæ brown to almost black; segment i. larger than ii.; iii. longer than iv. with 10 to 20 sensoria in a line along greater part of its length; iv. a little longer than v. Rostrum reaches to second coxæ or beyond. Cornicles black, long, cylindrical, reticulate at apices; now and then reaching beyond end of cauda. Legs green; apices of femora and tibiæ and the tarsi black. Wing insertions yellow; stigma brownish-grey. Cauda green, long, ensiform, with 5 pairs of lateral hairs and a sub-apical curved one.

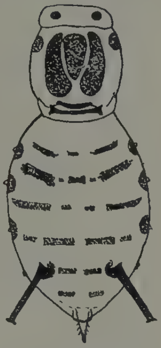

Fig. 47. *Macrosiphum rubiellum* Theobald. Body markings of alate female.

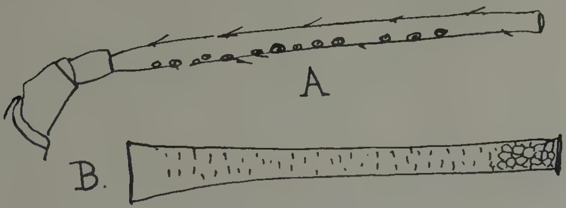

Fig. 48.—*Macrosiphum rubiellum* Theobald. A, Base of Antenna of alate female, and B, Cornicle.

Length 2.5 to 3 mm.

Apterous viviparous female. Green to pale yellowish-green. Antennæ as long or longer than body, yellowish-green; segment

vi. brownish; apices of iv. and v. dark; iii. longer than iv., one sensorium near base. Cornicles long, thin, green to deep green, dusky at their apices, and slightly expanded basally; a few large more or less hexagonal reticulations and smaller ones at apices. Cauda pale yellowish-green, rather short. Legs yellowish-green to pale green; tarsi dusky; femora with a few hairs; tibiæ with many short hairs.

Length 2.5 to 3 mm.

Oviparous female. Green. Cornicles black. Cauda green. Eyes black. Antennæ green; apex of iv. and all segments v. and vi. black. Legs green, except apices of tibiæ and the tarsi. Antennæ about as long as or a little longer than body; segment i. larger than ii.; iii. longer than iv., but much shorter than vi.; iv. about as long as v.; vi. longer than iv. + v., basal area not quite half v.; flagellum long. Cornicles black, a little longer than antennal segment iii. and somewhat expanded basally; apex reticulate; divergent. Cauda a little less than one-third the cornicles, and broader; bluntly pointed; spinose; with numerous lateral hairs. Anal plate green, hairy. Hind tibiæ long and broadened, with numerous sensoria, especially on broadened basal half. Rostrum green, dark at apex, rather broad and reaching to or just beyond second coxæ. A few short hairs on body.

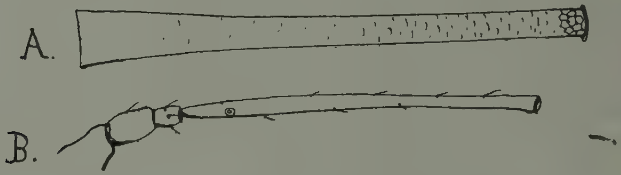

Fig. 49.—*Macrosiphum rubiellum* Theobald.
A, Cornicle and B, base of antenna of apterous female.

Length 1.5 to 1.8 mm.

FOOD PLANTS. *Rubus fruticosus* and *Rubus idæus*; *Galium aparine* and *Galium sp.*

LOCALITIES. Windermere (14 xi. 14) (Rymer Roberts); Ventnor, Isle of Wight (7. vi. 11); Wye; Maidstone; Ramsgate; Ashford; Bearsted; Paddock Wood; Tonbridge, in Kent;

Guildford ; Bramley ; Woking in Surrey ; Little Hadham, Herts. ; Lymington and Brockenhurst, Hants. ; Fowey and Truro, Cornwall ; Crundale, Kent, at various times ; Chilham, Kent (23 v. 23) on American Blackberry (F.V.T.) ; Brenchley, Kent (M. Wimshurst) viii. 23 ; Aber., N. Wales, 14 xi. 24 (C. L. Walton).

Mr. F. Laing adds the following :—

E. Malling ; Stanmore ; Wimbledon Common ; Kew Gardens ; Reading ; Uxbridge ; Midhurst ; Newton Abbot ; Birmingham ; Stratford-on-Avon ; Princes Risborough.

Observations. I described this species from alate and apterous viviparous females taken at Ventnor and Little Hadham in the same year. It appears to be a more or less common species on the young shoots and leaves of the Bramble. I have several times taken it in great numbers on the cultivated Raspberry, where it was causing much harm to the foliage. It has also been reported as damaging the foliage of American Blackberries in England. It occurs in great numbers in May and June, and some go on upon the Bramble until July, when they have all become winged and have flown away. It apparently migrates to several alternate host plants, but species of *Galium* seen to attract it most of all. In the autumn alatæ fly back to the Brambles and on them the oviparous females develop and lay their eggs. The return migrant females have shorter cornicles than the summer form. Mr. Rymer Roberts sent me some oviparous females during November, 1914, from Windermere, where they were then ovipositing. The males have not yet been observed. I also found some oviparous females on the Raspberry, where they were watched ovipositing.

MACROSIPHUM CYPARISSIÆ Buckton (non Koch).

Siphonophora cyparissæ Buckton.

Buckton, Mono. Brit. Aphid., I., 113 pl. V. (1875).

Alate viviparous female. " Large, bright green, shining. Pro-, meso- and metathorax shiny black. Abdomen green, shining, without any markings or lateral spots as in *S. rosæ*. Eyes red. Antennæ and legs longer than in *S. rosæ*. Antennæ brown, with the exception of the third segment, which is ochreous. Legs hirsute, ochreous ; tarsi black. Cornicles much curved as in the apterous form. Cauda yellow. Wings ample; irridescent; stigma smoky; veins greenish-brown.

Length 2.74 × 1.13 m.m.

Apterous viviparous female. Bright green, with a slightly mealy coat. A broad, undefined, darker green stripe occurs down the dorsum. Eyes red. Antennæ longer than body, ochreous yellow, with darker tips. Cornicles very long, black, thickest at base, curved. Legs fine, yellow, knees and tarsi dark brown. Rostrum short.

Length 2.54.

Pupa. Pale whitish green, with dark brown wing cases. The rest like the larva."

Observations. Koch records his *cyparissiæ* from *Euphorbia cyparissia.* Buckton from *Rubus fruticosus* and *Scabiosa succisa* in July.

Buckton's slide in the British Museum is in poor condition and until it is re-mounted we cannot say what it is. It looks to me like my *rubifolium*, i.e., *rosæ ?*

MACROSIPHUM OLIVATUM Buckton.

Siphonophora olivata Buckton.

Buckton, Mono. Brit. Aphid., I., 164, pl. XXIV., figs. 3 and 4 (1875); Theobald, Journ, Eco. Biol., VIII., 79, figs. 18, 19 (1913).

Mr. F. Laing adds the following note :—

"I think that there is just a possibility of *olivatum* being a synonym of *alliariæ* Koch (p. 160)."

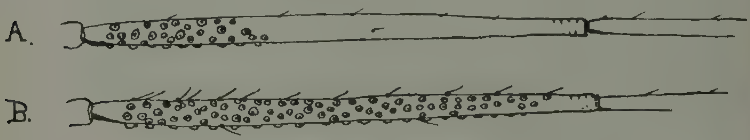

Fig. 50.—*Macrosiphum olivatum* Buckton.
A. Segment III. of apterous ♀ antenna; B. of alate ♀.

Apterous viviparous female. Deep olive brown to rich deep brown, with minute dark tubercles, from which arise hairs. Antennæ longer than body; segments i. and ii. and iv., v. and vi., deep olive; iii. yellowish, with 30 to 38 unequal sized sensoria on basal half, where there are many hairs on one side, two or three beyond them and five on the other side; segments iv. and v. nearly equal. Cornicles long, straight and rather narrow; black; apex reticulate, remainder imbricated. Cauda black, rather long and acuminate, paler at the base. Hairs posteriorly, minutely capitate, also on head. Legs long, of a rich ochreous colour, with broad black areas at apices of femora and tibiæ; tarsi black; hairy. Rostrum ochreous, last two segments black.

Length 3 mm.

Alate viviparous female. Head and thorax black. Abdomen deep reddish-brown, with four lateral spots and black tubercles, from which arise hairs; some caudad minutely capitate, and a few on frontal lobes. Antennæ long, deep olive-brown, base of segment iii. paler; the latter with numerous sensoria on its whole length, except just at apex; hairs capitate. Cornicles shiny black, long thin, expanded at base and slightly curved; apex reticulate. Cauda long, narrow, pointed, yellowish, with a marked single dorsal spine near apex. Legs as in apterous viviparous female. Wings large; yellowish-green stigma and insertions.

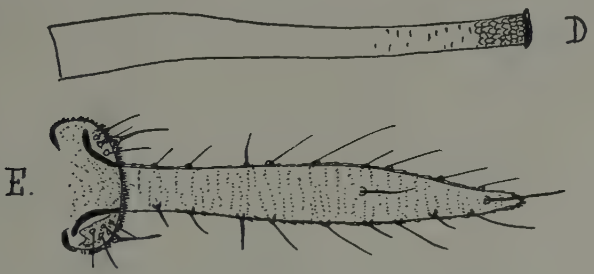

Fig. 51.—*Macrosiphum olivatum* Buckton.
D. Cornicle; E. Cauda of alate female.

Length 2.8 to 3.2 mm.

Localities. Lynchmere, Sussex, viii. (Buckton); Wye, 7 and 29 vi. 11; Haddenham, Cambs., 19 vi. 11; Ventnor, Isle of Wight, 26 iv. 12 (F.V.T.); Crook (Rymer Roberts); Midhurst; Cadnam and Lyndhurst; Epping Forest (Laing).

Food Plants. *Carduus lanceolatus* and other species of Thistles.

Observations. Buckton, who described this insect, says that the cauda of the apterous female is black. Those I have found have a black cauda in the larvæ, but the mature apteræ have it pale at the base and as usual much longer than in the larvæ; in a few in one colony it was almost entirely black. This species lives in large masses clustered up the flower stalks of the Thistles, and I have noticed especially on those growing near water. It is largely attended by Ants. Alatæ occur in July and August. Buckton places Walker's *carduina* with a query, this latter is quite a distinct green species coming in *Capitophorus* and was placed by Schouteden in the genus *Phorodon*.

MACROSIPHUM GITHARGO Theobald (nov. nom.).

Siphonophora cichorii Buckton (part) non Koch.

Theobald, Journ. Eco. Biol., VIII., 147, 54 (1913); Buckton, Mono. Brit. Aphid I., 163, pl. XXIX., fig. 2 (1875).

The winged female described by Buckton as *S. cichorii* Koch is as follows:—" Larger than the larva (this larva Buckton did not describe—F.V.T.). Very smooth and shiny. Entirely fine reddish-fawn colour. Tail, femora and wing insertions fine yellow. Antennæ, tibiæ, tarsi and cornicles black. Cubitus and stigma pale. Veins very delicate. The sides of the insect are covered slightly with a greyish bloom. Feeding on the Corn Cockle or Campion, *Agrostemma githargo*, in June at Haslemere." Buckton adds; " Although this Aphis does not entirely agree with Koch's description, I believe the two insects to be identical. Notwithstanding Kaltenbach's suggestion that *Siphonophora cichorii* is *A. serratulæ* of Linnæus, I must express doubts as to the fact."

It appears to me that Kaltenbach is correct and Buckton in error. I have, however, been so far unable to find these insects in Britain.

Mr. Laing adds: " There is no slide in the Buckton Collection to settle the matter. I have never found the species myself, though I have looked for it."

MACROSIPHUM TANACETI Linnæus-Buckton.

Aphis tanaceti Linnæus.

Siphonophora tanaceti Koch-Buckton.

Linnæus, Syst. Nat., II., 735, 18 (1767); Kaltenbach, Mono. Pflanz, 47 (1843); Koch, Die Pflanz, 3, 156, figs. 211, 212 (1855);

Fabricius, Ent. Syst. IV., 217, 36 (1794); Schrank, Fn. Boica, II., 123, 1241 (1801); Buckton, Mono. Brit. Aphid, I., 151, pl. XXIII., figs. I, 2 (1875); Gillette, Journ. Eco. IV., 382, figs. 9 and 9a (1911); Theobald, Journ. Eco. Biol. VIII., 74, 13 (1913).

I have not found this species, but Mr. Laing has lent me a slide and I add a few notes on it. I also append a description of Buckton's *tanaceti*, which is warm dark brown in the alate female, and reddish-brown in the apterous female.

Buckton's slide of the alate viviparous female shows the following characters:—Antennæ not quite so long as body; Segment i. larger than ii., iii., longer than iv., with 11-13 sensoria, not near base, nor apex; iv. and v. about equal or iv. longer than v., vi. much longer than iii. Rostrum to third coxæ. Cornicles narrow, about width of antennal segment iii. shorter than iv., slightly curved in middle, slightly expanding at base and apex; a wide reticulate apical area, remainder strongly imbricate. Cauda $\frac{3}{4}$ of cornicles, broad at base much narrowed at apex, with a few long hairs. Anal plate broadly triangulate. Small lateral abdominal papillæ. Head rather flat in front. Head and body with a few hairs. Tibiæ with many hairs.

"*Apterous viviparous female.* Globose, flat, shining. Warm dark brown. Head blackish, broad. Eyes coral red. Thoracic rings with fine yellow edges. Abdomen domed and carinated, rather shining. Carina yellow, with reddish stain. Two dark dots above the thorax. Cornicles black, fine and straight. Tail reddish-black, obtuse, hairy. Antennæ long, fixed on small frontal tubercles, black and hirsute. Legs short, wholly black, hairy. Hind tibia curved. Underside yellowish-brown with dark coxæ and anal plate. Rostrum reaching to the third coxæ. This insect stains Canada balsam a fine red colour. Taken by Mr. Walker at the Isle of Wight, September 8th. It feeds on the Tansy (*Tanacetum vulgare*).

"*Winged viviparous female.* Size of body 2.54 by 1.23 mm. Large. Head and thorax brown. Antennæ rather shorter than those of the species last described. Abdomen broad, without tubercles, reddish-brown, with a darker patch above the cornicles and four smaller spots at the outer edges. Cornicles thin, straight, and black. All the legs black and hirsute. Tail short and yellowish. Insertions of wings yellow. Cubitus and veins pale, the last fine. Stigma greenish. The specimen from which the figure is taken was found with others on *Lapsana communis* in June. At other times I could not find a single wingless female in company."

Mr. Laing adds this note :—

" I take it that Buckton is in error here. It is unlikely that the species would be found on such discordant hosts."

I have failed to find a species answering to *tanaceti* in the Isle of Wight. Walker considered it to be a synonym of *absinthii* (List. Homop. Ins. Brit. Mus., IV., 9, 65, 56, 1852). Gillette records it from America. Schouteden treats it as a *Myzus*. There is a *Myzus* on *Tanacetum* (vide under that genus).

MACROSIPHUM SONCHI Linnæus.

Aphis sonchi Linnæus.
Siphonophora sonchi Passerini.
Siphonophora achilleæ Koch.
Siphonophora lactucæ Koch (non Fabr.).
Sonchifex Amyot.
Aphis serratulæ Linnæus and Schrank.

Linnæus, Syst. Nat., II., 735, 15 (1767) ; Fabricius, Sp. Ins., II., 390, 48 (1781) ; Mant., Ins., II, 317, 53 (1787) ; Ent. Syst., IV., 220, 53 (1794) ; Syst. Rhyng., 302, 53 (1803) ; Schrank, Fn. Boica, II., 120, 122, 1232 (1801) ; Rossi, Fn. Etrusc., 265, 1042 (1790) ; Kaltenbach, Mono. Pflanz., II., 28 (1843) ; Walker, Ann. Nat. Hist., Se. 2, II., 197, 46 (1848) ; Zoologist, VI., 2246, 2248 (part), (1849) ; Koch, Die Pflanz. 159, figs. 215-216 (achilleæ), 160, figs. 217, 218, 219 (1855) ; Buckton, Mono. Brit. Aphid., I., 161, pl. XXVIII. (1875) ; Gillette, Journ. Eco. Ent. IV., 383, figs. 13, 13a (1911) ; Theobald, Journ. Eco. Biol., VIII., 64, fig. 6 (1913) ; Blanchard, Physis V., 20, p. 192 (1922) ; Moreira, Bol. 2. Min. d. Agri. Inst. Biol. d. Agri. Brasil 25 (1925).

Alate viviparous female. Head and thorax deep black, more or less shiny ; abdomen rich shiny chestnut to reddish-brown, with three black spots on each side, before the cornicles and one behind them, from which arise hairs from small tubercles (seen as small pale spots in balsam preparations), a dark patch at the base of the cornicles and an elongate black patch between these two. Antennæ long and black, arising from large frontal lobes ; segment iii. with sensoria along its whole length, between 48 to 55 in number; hairs slightly expanded at their apices; segment v. very slightly shorter than iv. Cornicles very long and thin, black, the apices with large hexagonal reticulations. Cauda pale, long, with numerous hairs. Legs yellowish to yellowish-brown; a broad black area on apices of femora; one on the tibiæ, smaller in size; tarsi black; hairs short, pale. Wings with yellowish insertions and pale yellowish-brown stigma and veins.

Length 2.5 to 3 mm.

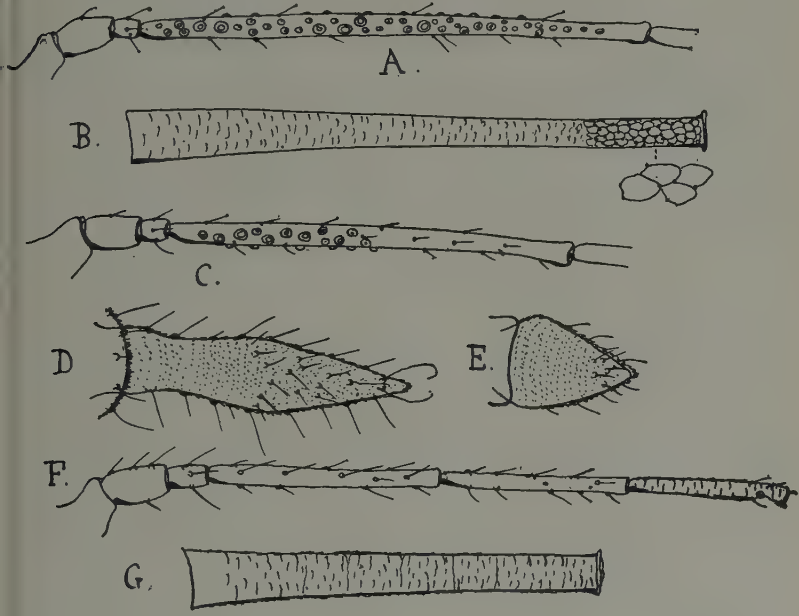

Fig. 52.—*Macrosiphum sonchi* Linnæus.

A, Part of antenna; B, Cornicle; D, Cauda of alate female; C, Antenna of apterous female; E, Cauda; F, Antenna; G, Cornicle of larva.

Apterous viviparous female. Rich chestnut brown to deep reddish brown, shiny. Antennæ long, arising from very large frontal processes, black to pale brown; segment iii. a little longer than iv., with 17 to 28 sensoria on the basal half*; v. shorter than iv. Abdomen with rows of hairs arising from tubercles. Cornicles long, black, thin, with reticulations at apices. Cauda elongate and yellow. Legs long and thin, ochreous; apices of femora base and apex of tibiæ black; tarsi black; the tibiæ are very long with short hairs.

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* Blanchard finds 12 to 16 sensoria in Argentine specimens.

Length 2.5 to 3 mm.

LOCALITIES. All over Britain and the Continent, N. America (Gillette), Buenos Aires, S. America (Blanchard), Brazil (Moreira), Uganda (Theobald).

FOOD PLANTS. *Sonchus oleraceus*; *Centaurea nigra* and cultivated varieties; *Serratula arvensis*; *Chrysanthemum segetum* and cultivated Chrysanthemums; *Lapsana communis*; *Carduus spp.*; Buckton gives *Picris hieracioides*; *Hieracium sylvestre* and *H. boreale*; *Crepis biennis* and *Carduus nutans.* Lettuces (*Lactuca*) F.V.T.; *Cichorium* (Blanchard).

Observations. This species is quite well defined. It has been recorded by Walker as being almost omnivorous; no less than thirty food plants being named by him. I think, however, that Walker refers to more than one species. He gives as synonyms: *Aphis jaceæ* Linn; *Jaccifex* Amyot; *Aphis picridis* Fabr.; *Picridifex* Amyot; *Aphis cirsii* Linn; *Aphis cnici* Schrank; *Aphis solidaginis* Fabr.; *Aphis cardui* Fonscolombe, and *Aphis taraxaci* Kalt. Several of these are clearly distinct. Koch describes a *Siphonophora lactucæ* Fabricius, which is clearly this species; he found it on *Lactuca perennis.* Kaltenbach also considered it to be *sonchi*, but Buckton disagreed with this. It is subject to some variation, according to the plant it is found on, but the structural characters are all very close in those found on different plants mentioned here. The very bristly cauda is characteristic. Walker's long description (Ann. Mag. Nat. Hist., II., Se. 2, 197) (1848) as previously mentioned evidently covers more than one species. Blanchard (Physis. Buenos Aires, XX., July 22) says it is injurious to Chicory in the Argentine.

MACROSIPHUM SISYMBRII Buckton.

Siphonophora sisymbrii Buckton.

Buckton, Mono. Brit. Aphid, I., 160, pl. XXVII., figs. 4 and 5 (1875); Theobald, Journ. Eco. Biol., VIII., 66 (1913).

"*Apterous viviparous female.* Rich ochreous-brown, very shining. Head, thorax and abdomen divided from each other by a bright ochreous band. Lower part of the abdomen and lateral edges ochreous. Body covered by small black, tufted tubercles. Tail long and yellow; nectaries black. Legs wholly black, except the upper halves of femora, which are bright yellow.

Length 2.54 mm.

Winged viviparous female. Colour much as in the apterous female. Cornicles relatively shorter. Antennæ very long. The abdomen in the winged state is not tuberculate or tufted with hairs. Wing insertions pale green. Stigma greyish. Veins fine.

Length 2.54 mm.

This insect has some resemblance to *S. sonchi*, but differs from it in having the tarsi all black, a smooth abdomen and by the presence of three large obscure spots on the abdominal edges. The underside is all green, except a black anal patch. Taken plentifully at Pembroke in August on the Hedge Mustard or Rocket, *Sisymbrium officinale*, by Mr. Charles Barrett."

The following notes are added from Buckton's slide in the British Museum.

Alate viviparous female. Antennæ longer than body; segment i. larger than ii.; iii. much longer than iv., with many sensoria over nearly whole length; iv. longer than v.; flagellum about equal to iii.; numerous hairs on iii., a few on iv. and v. Cauda pale, acuminate, several long hairs each side, Cornicles long, with large reticulate apical areas. Legs black, except trochanters and base of femora.

Apterous viviparous female. Antennæ longer than body. segment i. larger than ii.; iii. long, with 39 sensoria up to near apex; iv. longer than v. Cornicles large black, cylindrical, a large apical reticulate area. Cauda long, more than half of cornicles, with many hairs. Legs, black, except trochanters and base of femora. Body with hairs, all capitate.

MACROSIPHUM FRAGARIÆ Walker (non Buckton).

Aphis fragariæ Walker.
Siphonophora fragariæ Koch.

Walker, Ann. Mag. Nat. Hist. Se. 2, II., 431 (1848); Koch, Die Pflanz, 173, figs. 237, 238 (1855); Theobald, Journ. Eco. Biol., VIII., 123, 35 (1913); Theobald, Entomologist, 182 (1915).

Alate viviparous female. Green to greenish-yellow; head black; thorax, antennæ and cornicles black. Legs greenish to reddish-yellow with black apices to femora and tibiæ; tarsi black; femora and tibiæ hairy. Abdomen with four black spots on each side and several faint dorsal median marks; two large black spots caudad of cornicles, followed by a small pair. Eyes black. Cauda a pale reddish yellow. Cornicles long and thin. Antennæ longer than body, arising from prominent frontal lobes; segment i. larger than ii.; iii. much larger than iv., with 65 to 80 round sensoria of two sizes, spread over all but the apex and mainly on one side; iv. slightly longer than v.; vi. a little longer than iii., flagellum rather long. Cornicles not quite so long as antennal segment iii., cylindrical, rather narrow and to some extent irregular in outline, apex reticulate. Rostrum reaches to third coxæ. Wings ample, veins greenish-brown; stigma greyish-brown, insertions green to yellowish.

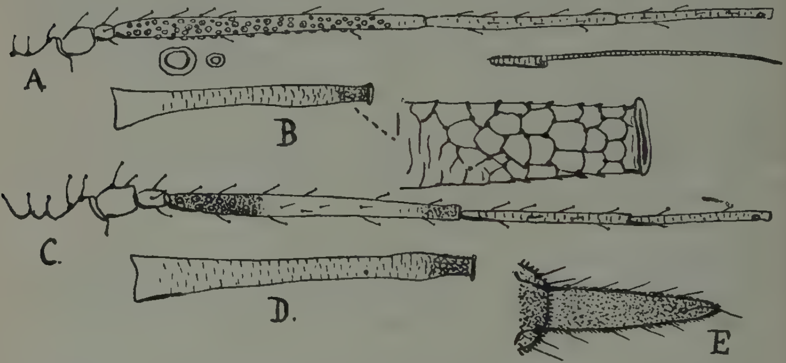

Fig. 53.—*Macrosiphum fragariæ* Walker.
A. Antenna; B. Cornicle of Alate ♀; C. Head and Antenna; D. Cornicle; E. Cauda of Apterous ♀.

Length 2.2 to 2.5 mm.

Apterous viviparous female. Bright grass green to pale reddish-yellow; head and pro-notum deep brown. Antennæ longer than body, black, except median area of segment iii. which is pallid. On the abdomen are small black lateral spots, which spread out laterally; behind cornicles are two pairs of large brown spots. Cornicles long, jet black, slightly curved outwards. Cauda pale greenish. Legs much as in alate female. Segment i.

of antennæ larger than ii.; iii. longer than iv.; iv. longer than v.; vi. longer than iii., basal area moderate; iii. with 8 to 12 round sensoria on the black basal area; hairs capitate. Cornicles cylindrical, somewhat expanding basally; apex reticulate; longer than antennal segment iii. Cauda about half length of cornicles, with 5 hairs on one side, 4 the other, and a sub-median one; spinose. Anal plate darker, very spinose, with 2 hairs each side. Rostrum green, apex black and narrow, reaching to third coxæ.

Length 2.5 mm.

FOOD PLANTS. Cultivated and wild Strawberries; and *Centranthus*.

LOCALITIES. Kingston-on-Thames (vi. 99); Wye, Kent (30 vi. 14; vii. 05 and 06); Sevenoaks (2 v. 90), F.V.T.

Observations. I took this well-marked species in 1899 on garden strawberries at Kingston-on-Thames, where it was doing considerable damage and also found small colonies at Wye in 1914 doing some slight harm. Buckton records it, but his apterous viviparous female is certainly not Koch's species, for he describes it as being wholly green, except for the tips of the cornicles and the dark olive green antennæ. The alate female is also not Koch's *fragariæ*; it has a row of sensoria along one side of segment iii. of antennæ. In 1914 I found this beautiful Aphid in great numbers on the flower stalks of young *Centranthus* at Wye on June 30th; two alate females and masses of apteræ. On searching some neighbouring strawberries I found a few of this insect scattered about the beds, on the leaves and strigs. One alate female had a dull reddish-green body, the other light green and two mature apteræ were red, with similar black heads and cornicles. The very black head and long outwardly curved, jet black cornicles at once demark this species. Mr. Laing informs me that Walker's *fragariæ* is a *Macrosiphum* and that a slide of it exists in the Hope Museum at Oxford. I have adopted Walker's name.

MACROSIPHUM MURALIS Buckton.

Siphonophora muralis Buckton.

Buckton, Mono. Brit. Aphid, I., 157, pl. XXVI. (1875); Williams, Neb. Univ. Studies, 10 (1911); Theobald, Journ. Eco. Biol., VIII., 2, 70 (1913).

Alate viviparous female. Almost linear. Head and thorax dark brown. Antennæ long and black. Abdomen long, oval, garnet red to dull red; the dorsum without any markings or tubercles. Cornicles black, long and thin, usually carried at more or less right angles to the body. Cauda yellow and rather long. Legs, pure yellow, apices of femora and tibiæ dark; tarsi dark. Wings large; insertions yellowish; costa and stigma pale brown, veins rather dark. Segment i. of antennæ larger than ii.; iii. long, with 30 to 35 sensoria, giving a tuberculate appearance; iv. a little longer than v., with 0 to 4 sensoria; flagellum long. Cornicles long and thin, not quite so long as antennal segment iii.; apex reticulate. Cauda with four hairs one side, three the other, and two dorso-apical ones, rather more than half the length of the cornicles to less. Rostrum not reaching the second coxæ. A few hairs on body and head.

Length 2.1 to 2.4 mm.

Apterous viviparous female. Shiny brown, some with a dull reddish hue; cornicles long, black, cylindrical; cauda pale yellow, about half the length of the cornicles to a little more; antennæ longer than body, dark; legs same colour as body, apices of femora and tibiæ dark and the tarsi. Rostrum dark, a little paler at the base. Segment i. of antennæ much larger than ii.; iii. longer than iv., with 25 to 28 sensoria over its whole length; iv. about the same length as v.; flagellum long. Rostrum reaching to or beyond the second coxæ. Cornicles long, not quite so long as antennal segment iii.; slightly expanding basally; the apices reticulate. Cauda with four hairs each side and one dorso-apical. Head with a few short hairs. Body with short scattered, single hairs. Tibiæ with numerous short hairs, a few on apices of femora.

Length 2.9 to 3.0 mm.

Male. "This sex is remarkably small. Colour uniformly umber-brown. Legs and cornicles ochreous. Femoral and tibial joints darker brown. Antennæ long and placed on projecting but non-conspicuous tubercles. Wings very delicate, with grey stigma and veins. Found indiscriminately with the viviparous females" (Buckton). Mr. Laing says that this is an alate *Myzus persicæ*.

Oviparous apterous female. In company with the above males, some small cinnamon-brown insects, with broad heads and short, stout yellowish legs, were observed. These probably were the true females, although no ova could be detected within. The absence of eggs might be due to the early time of year, viz., the first week in July. The species was feeding on the flower stalks of *Latuca muralis* at Weycombe, Haslemere" (Buckton). This slide Mr. Laing finds to be an immature apterous female.

FOOD PLANT. *Lactuca muralis.*

LOCALITIES. Weycombe, Haslemere, vii. (Buckton); Mannerck, Flintshire, 4 x. 24 (Dallman).

Observations. A small very marked *Macrosiphum.* Mr. A. Dallman sent me a number of alate and apterous females, which he found very plentifully. I have never been able to find this insect myself in the South of Britain, although I have searched *Lactuca muralis* frequently. I doubt if Davis' *muralis* is the same, but I append his description for reference.

"Williams' The Aphididæ of Nebraska":—

"*Winged female:* antennæ longer than the body; segment iii. very long, as long as v. and vi. together; iii. with 94 to 122, tuberculate, irregularly placed, circular sensoria; iv. with 2 to 7; v. and vi. bare, with the usual distal ones. In the balsam mounts the cornicles do not quite reach to the tip of the style; tips of the cornicles reticulated. Average length of cornicles 0.51 mm.; of style 0.35 mm.; of body (not including style) 1.9 mm., width 0.84 mm. *Wingless female:* antennæ a little longer than body. Segment iii. with about 75 irregularly placed, tuberculate sensoria none on iv. and the usual ones on v. and vi. Cornicles reaching to end of body, but not to tip of style; ends of cornicles reticulated. Three winged, two wingless adults, and one immature on the slide. On *Lactuca.* Fremont, July 31st, 1890."

Judging from Davis' figures (pl. VI., figs. 100-103) it is extremely unlikely that it is *muralis*; the cornicles are very distinct from those of Buckton's figures and the antennal sensoria on segment iii. of the antennæ are much more numerous than in Buckton's species.

MACROSIPHUM JACEÆ Linnæus.

Aphis jaceæ Linnæus.
Siphonophora jaceæ Koch.
Aphis cardui Boyer (?).
Aphis cirsii Linnæus.
Aphis sonchi Walker (part).

Linnæus, Fn. Suec., 991 (1746); Syst. Nat. Ed., 10, 452 (*cirsii*) (1758); Syst. Nat. 1, 11, 735, 20 (1767); Schrank, Fn. Boic., II., 124, 1244 (1801); Scopoli, Ent. Carn., 138, 403 (1763); Kaltenbach, Mono. Pflanz, 26 (1843); Koch, Die Pflanz, 162, figs. 220, 221 (1855); Buckton, Mono. Brit. Aphid, I., 153, pl. XXIII., figs. 3 and 4 (1875); Gmelin, Ed. Syst. Nat., 1, 4, 2206, 20; Walker, List. Homop., 963, 54 (1852); Schouteden, Aphid. Belg., 239, 12 (1906); Ferrari, Aphid Liguriæ, 58, 18 (1872); Passerini, Aphid. Ital., 11 and 15, no. 15 (1863); Theobald, Journ. Eco. Biol., VIII., 67, figs. 7-10 (1913).

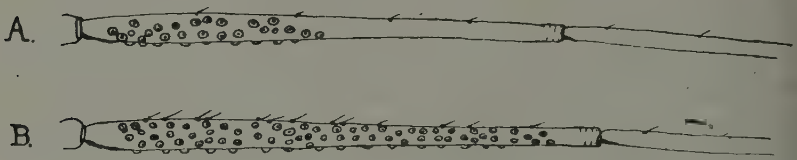

Fig. 54.—*Macrosiphum jaceæ* Linnæus.
A. Base of antenna of apterous ♀; B. Alate ♀.

Alate viviparous female. Shiny brown with metallic sheen; hairy. Antennæ black, longer than body; segment iii. longer than iv.; iv. longer than v.; vi. nearly as long as iv. + v.; basal segment large; iii. with 65 to 80 sensoria over whole length, with numerous hairs; iv. with no sensoria. Cauda long and black, rather thin, 6 to 7 long hairs each side. Cornicles long, narrow, cylindrical, black, apex markedly reticulate. Legs black, except base of femora. Wings with cubitus yellowish; stigma and insertions yellowish.

Length 3.5 to 4 mm.

Apterous viviparous female. Dark brown, with greenish to brassy lustre. Antennæ dark; basal segment large; iii. longer than iv., with 25 to 38 sensoria on basal half; iv. longer than v.;

vi. nearly as long as iv. + v. Hairs of head capitate. Abdomen with tufts of bristles arising from tubercles. Cauda black, long, narrow, acuminate, with 7 to 8 hairs each side. Cornicles black, long and rather narrow, cylindrical, apices reticulate. Legs as in alate ♀.

Length 2.5 to 3mm.

Male. Alate. Head and thorax black. Antennæ with apical half dark brown; basal half black. Cauda and cornicles black. Abdomen very dark reddish-brown, in some almost black. Cubitus, stigma and insertion of wings yellowish-brown; veins much same colour. Antennæ longer than body, basal segment larger than ii.; iii. longer than iv., but not so long as vi., with 48 to 55 sensoria over whole length; iv. as long as v., with 16 to 18 sensoria; v. with 13 to 15 and the usual primary one; flagellum of vi. long. Rostrum reaches to third coxæ. Cornicles long, narrow, black, reticulate at apex, shorter than antennal segment iv. Cauda dark, elongate, spinose, less than half the cornicles, broad at base, several long pale hairs. Claspers dark, narrowly cone shaped, with small hairs. Penis short and blunt.

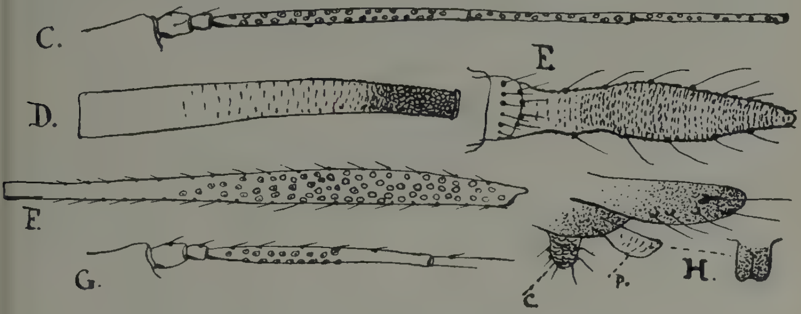

Fig. 55.—*Macrosiphum jaceæ* Linn.

C. Antenna of Male; D. Cornicle of Alate ♀; E. Cauda of Alate ♀; F. hind tibia and G. base of antenna of Ovi. ♀; H. Male genitalia; p. penis; c. clasper.

Length 2 to 2.7 mm.

Oviparous female. Apterous. Dark reddish-brown; head black; pro- and meso-thorax blackish dorsally. Antennæ dark brown; basal segments black. Cornicles black. Coxæ black; base of femora ochreous, rest black; tibiæ brown; tarsi deep brown. Abdomen with blackish dorsal tubercles. Cauda black. A black patch on venter of abdomen at apex. Rostrum black. Antennæ as long as or longer than body; segment iii. with sensoria on basal half; iv. a little shorter than iii.; v. a little shorter than iv.; vi. about as long as iv. + v. A few scattered hairs on antennæ. Cornicles as in the other forms. Cauda large, black, four hairs each side. Hind tibiæ long, with many sensoria up to near apex.

Length 2.5 to 3 mm.

FOOD PLANTS. *Centaurea nigrescens* (Kaltenbach); *C. nigra; C. cyanus*; *Alsine* (Schouteden); *Ruta graveolenti* (Ferrari); *Scabiosa spp*; *Carduus nutans*; *C. acanthoides*; *C. crispus* (Kaltenbach); *Sonchus oleraceus* (Buckton); *Carduus arvensis* (Linnæus).

LOCALITIES. Wye, Crundale, Herne Bay, Faversham, Bearsted, Swanley, Tenterden, in Kent; Kingston-on-Thames, Esher, Egham, Godalming, Woking, Weybridge, Wisley, Haslemere, in Surrey; Cambridge; Rye, Hastings, Eastbourne, Hailsham, Coleman's Hatch, Tunbridge Wells in Sussex; Ventnor, Brockenhurst, Corfe, Weymouth, Lymington, Hants; Little Hadham, Herts. (Theobald); Crook and Windermere (Rymer Roberts); Llanddona, Anglesey (Walton); Swordale, Ross-shire (D. Jackson); Roslin, Midlothian (Evans); Inveran, Invershin, N.B. (Jackson); Abbeyleix, Queen's Co., Ireland, 16 iv. 24 (Phillips), Hexthorpe, nr. Doncaster, vii. 24 (Dallman). Mr. Laing adds it is general throughout N.E. Scotland, and that it is probably general throughout Britain.

Observations. The ova are laid on the Knapweed in October and on into November. Some fall to the soil, others remain on the dead seed-heads. They hatch in late April and apteræ occur until July, when alate viviparous females appear. The first of these I took on July 2nd in 1906. These fly to other Centaureæ and Scabiosæ, and reproduce in a similar manner. In October sexuales often occur in numbers, but the alate males are evidently rare. The oviparous females look just like the viviparous apteræ and cluster in dense masses up the flower stalks and on the flower heads. The larvæ differ in having the cornicles entirely imbricated, shorter and thicker, and in having no antennal sensoria. It also occurs on Thistles, and there is little doubt but that Linnæus' *Aphis cirsii* on *Cnicus* (*Carduus*) *arvensis* is the same.

MACROSIPHUM TARAXACI Kaltenbach.

Aphis taraxaci Kaltenbach.

Kaltenbach, Mono. Pflanz, 30 (1843) ; Theobald, Journ. Eco. Biol., VIII., 77, fig. 17 (1913).

Alate viviparous female. Head and thorax brownish-black to black. Antennæ black, as long as body ; segment iii. with many sensoria along most of its surface ; segment iv. shorter than iii. ; v. shorter than iv. ; vi. not so long as iv. + v. Abdomen reddish-brown, with short hairs, arising from dark tubercles. Cornicles long, black, cylindrical, apices reticulate. Cauda short, black. Legs dark, except base of femora, which are yellow ; femora, tibiæ and tarsi hairy ; hairs yellowish. Wings shiny, with yellowish stigma and cubitus and yellowish-brown veins, in some almost yellow.

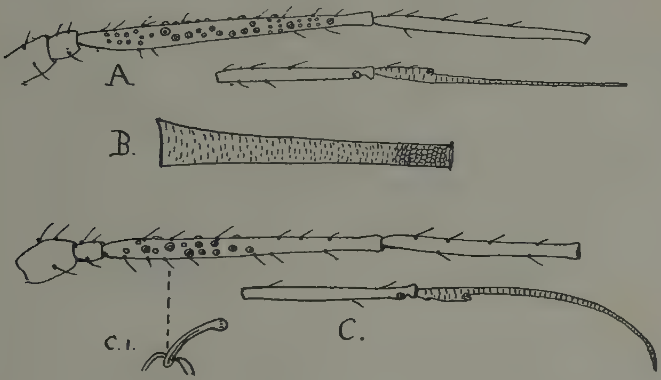

Fig. 56.—*Macrosiphum taraxaci* Kalt.
A, Antenna and B, Cornicle of alate female. C, Antenna of apterous female ; C1, Antennal hair.

Length 2.5 to 2.8 mm.

Apterous viviparous female. Coffee brown ; head and thorax somewhat darker than abdomen, with slight metallic sheen. Antennæ, cornicles and cauda black. Legs black, except base of femora, which are reddish-yellow. Antennal segment iii.

with 12 to 30 sensoria on basal half; iv. shorter than iii.; v. a little shorter than iv.; vi. not so long as iv. + v.; hairs on iii. to v. yellowish. Cornicles with large apical reticulate area, remainder imbricated. Abdominal hairs arising from dark tubercles. A few antennal hairs capitate, more marked in some specimens than others.

Length 2.8 to 3 mm.

FOOD PLANT. *Taraxacum dens-leonis.*

LOCALITIES. Great Salkeld, Penrith, 14 vi. 12 (Britten); Wye, 17 vi. 11; Okehampton, Devon, 2 vi. 09; Hastings, vi. 01; Abingdon, vii. 15 (F.V.T.); Belgium, Germany and N. America.

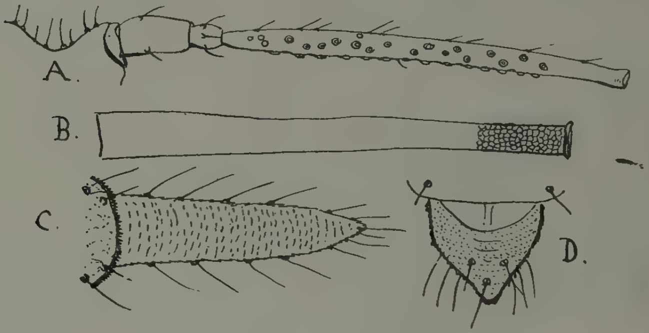

Fig. 57.—*Macrosiphum solidaginis* Fabr.
A, Head and base of antenna; B, Cornicle; C, Cauda of alate female; D, Cauda of larva.

Observations. This species is found in the apterous form under the lower leaves of the Dandelions and sometimes passes to the parts just below the surface of the soil. The alate females occur on the leaves and on the flower stalks. It does not appear to be commonly distributed, but I found it in abundance at Okehampton. Some specimens sent me from the United States agree exactly with British specimens.

MACROSIPHUM SOLIDAGINIS Fabricius.

Aphis solidaginis Fabricius.
Siphonophora solidaginis Koch; Buckton.

Fabricius, Ent. Syst., IV., 211, 5 (1794); Syst. Rhyng, 225, 5 (1802); Hausmann, Illiger, Mag. I., 442, 1 (1822); Kaltenbach, Mono. Pflanz, 32 (1843); Koch, Die Pflanz, 197, figs. 269, 270 (1855); Buckton, Mono. Brit. Aphid., I., 156, pl. XXX. (1875); Theobald, Journ. Eco. Biol., VIII., 63, fig. 5 (1913); Das, Mem. Ind. Mus., IV., 4, 164 (1918).

Alate viviparous female. Head and thorax deep black, shiny; abdomen various shades of deep red. Antennæ black on the first two segments and the last, rest pale; iii. with 32 to 40 sensoria spread over nearly its whole length, except just at apex, with a few comparatively large hairs on one side. Cornicles long, cylindrical; jet black; reticulate at apices. Cauda black, long, hairy; when fully extended nearly half-length of cornicles. Legs yellowish, with black areas at apices of femora and tibiæ; tarsi black. Insertions, cubitus and costa yellowish; stigma grey.
Length 2.7 to 3 mm.

Apterous viviparous female. Various shades of deep red and reddish-brown. Antennæ with the two first and the last segments dark, rest reddish and paler; iii. with 25 to 30 sensoria on basal half and some rather long hairs, a few also on basal segment. Long hairs on head and body; those on the latter arising from large tubercles. Legs yellow, black on apices of femora and tibiæ; tarsi dark; a few long, stiff hairs on legs. Cornicles black, long, cylindrical, apices reticulate. Cauda a deep reddish-black to black.
Length 3mm.

FOOD PLANTS. *Solidago virgaurea* (F.V.T.); *Scabiosa sp*; *Centaurea cyanus* and other *Compositæ* (Schouteden); *Sonchus oleraceus* and *S. arvensis* (Das); *Ageratum conizoides*; *Bidens pilosa; Chrysanthemum frutiscens; Senecio tenuifolia; Vernonia chinensis* (V. d. Goot).

LOCALITIES. Sidmouth, viii. 85; Lynmouth, 8 viii. 09; Worcester, 10 viii. 09; Shalford, 7 viii. 84; Wye, 14 vi. 11; New Romney, 10 viii. 12 (F.V.T.); Windermere (Rymer Roberts); Bettys-y-Coed, N. Wales (Petherbridge); Lahore, India (Das); Java (V. d. Goot), New Mexico (Cockerell—Laing).

Observations. Kaltenbach refers to this species as occurring on the Golden Rod (*Solidago virgaurea*) from August to October. Buckton records it as forming large clusters on the flower-stalks of the same plant. I have found it on the Golden Rod in numbers.

Whilst the young apteræ have always a black, blunt, short cauda, some of the mature apteræ have it reddish-black and when fresh pale red. I have taken both alate and apterous forms together in June and found it to continue until October. No sexual forms have been found, but they probably occur in late autumn and oviposit on the Golden Rod. Williams (Nebraska Univ. Studies, 10, 1918), records this species from Ashland, U.S.A., and others, but it does not seem to be our European species.

MACROSIPHUM AMYGDALOIDES Theobald.

Ent. Mo. Mag., Vol. LXI., p. 72 (1925).

Alate viviparous female. Head deep brown to almost black; thorax brown, lobes shiny black. Abdomen rich green, somewhat shiny. Eyes deep red to almost black. Antennæ deep olive-green; segment iii. and sometimes base of iv. pale green to ochreous. Legs green to ochreous green, apices of femora and tibiæ and the tarsi dark. Cornicles dark, olive green to deep brown. Cauda yellow to pale yellowish-green. Antennæ longer than body; segment i. larger than ii.; iii. longer than iv., much shorter than vi., with 14 to 17 sensoria extending over three-quarters of the segment; iv. equal to v., latter with the usual sub-apical sensorium; vi. with flagellum nearly as long as iii. Cornicles long, thin, cylindrical, shorter than antennal segment iii.; apex reticulate. Cauda acuminate, broadened towards the base, rather more than half the length of the cornicles, about

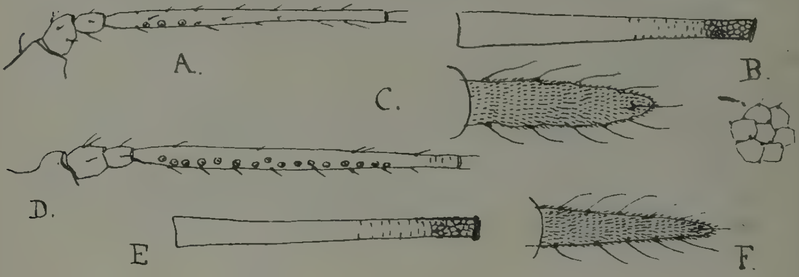

Fig. 58.—*Macrosiphum amygdaloides* Theobald.
A. Base of antenna; B. Cornicle; C. Cauda of Apterous ♀; D. E. F. Same of Alate female.

same width at apex, much wider at base, 4 to 5 hairs one side, 5 to 7 the other, rarely 5 on each side and an apical dorsal one; spinose. Anal plate rather small, rounded, spinose, with a few long hairs. A few hairs on body, especially apically and ventrally.

Length 3 mm.

Apterous viviparous female. Green; apices of antennal segments iii. and iv., most of v. and all vi. dark. Cornicles dark. Cauda green. Legs green, except apices of femora, tibiæ and the tarsi, which are dark. Eyes red. Antennæ longer than body; segment i. larger than ii.; iii. longer than iv, shorter than vi., with 3 to 4 round sensoria near base; iv. and v. about equal; iii. to v. with numerous hairs. Cornicles not quite so long as antennal segment iii., thicker, cylindrical, expanding slightly towards base, apices reticulate. Cauda rather more than half length of cornicles, broader, bluntly acuminate, slightly expanding basally, 4 hairs one side, 5 the other, and one dorso-apical. Rostrum to third coxæ, apex dark. Legs rather long; hairs on femora and tibiæ. A few rather long scattered ones on body.

Length 2.8 to 3 mm.

FOOD PLANT. Golden Spurge (*Euphorbia amygdaloides*).

LOCALITY. The Warren, Folkestone, 27 v. 21 and 29 v. 23.

Observations. Described from a number of alate viviparous females and a few mature apteræ, which swarmed with many immature forms on the stalks and in the flower heads of the Wood Spurge. I at first thought it must be a pale legged variety of Koch's *Siphonophora cyparissiæ*, but that species according to Mordwilko has non-reticulate apices to the cornicles. The absence of the black legs and antennæ and the black head in the apteræ also clearly demark this insect.

Buckton's slide of *cyparissiæ* referred to previously shows the long cornicles with reticulate apices, but it is nothing like this species.

MACROSIPHUM HELLEBORI Theobald and Walton.

Trans. Lancs. and Cheshire Ent. Soc., 1923.

Alate viviparous female. Head and thorax dark; abdomen green; legs same colour as body; apices of femora and tibiæ dark; tarsi all dark; cornicles darker than body; cauda pale; Antennæ deep greenish, apices of segments iii. to v. dusky and all vi.; rostrum green, apex dark. Antennæ longer than body; segment i. much larger than ii.; iii. much longer than iv., not quite so long as vi. with 17 to 18 sensoria along one side, not reaching apex and of unequal size; iv. about same length as v.; vi. with flagellum long and with normal sensoria. Rostrum reaches nearly to second coxæ. Cornicles long, thin, cylindrical, reticulate at apices, not quite so long as antennal segment iii. but thicker. Cauda long, acuminate, with several long hairs. Legs long and thin; tibiæ with many short hairs. Wings large, slightly tinted; insertions yellow. A few simple, curved hairs on head.

Length 2.5 to 2.9 mm.

Apterous viviparous female. Green; antennæ paler green, apices of segments iii. to v. dark; vi. dusky; cornicles green, apices dark; legs green, apices of mid and hind femora, all the tibiæ and the tarsi dark. Antennæ longer than body; segment i. much larger than ii.; iii. much longer than iv., not so long as vi., with 5 to 8 sensoria one side on basal half; iv. a little longer than v.; vi. with long flagellum; sensoria normal. Cornicles long and cylindrical, in some slightly swollen towards apices, about as long as antennal segment iii., not projecting beyond end of cauda; the dark apical area with marked reticulations. Cauda long, pointed, spinose, 4 hairs one side, 5 the other, not quite half length of cornicles. Anal plate rounded, spinose, with many hairs. Femora and tibiæ hairy. Antennæ with numerous hairs on segment iii. and a few on iv. and v. Eyes red. Rostrum reaches to just past the second coxæ.

Length 3 to 3.5 mm.

FOOD PLANTS. *Helleborus fœtidus* and *Helleborus sp*?

LOCALITIES. Denbighshire, v. 21; Bangor, 22 ii. 23 (Walton); Abergele, v. and vi. 21 (Dallman).

Observations. Described from a number of apteræ and a few alatæ from Denbighshire, sent by the Ministry of Agriculture. Mr. Walton found it on the flowers, leaves and bracts of *Helleborus fœtidus* at Bangor. Mr. A. A. Dallman had previously found this insect at Abergele.

MACROSIPHUM SILENEUM Theobald.

Journ. Eco. Biol., VIII., 143, 50, fig. 52 (1913).

Apterous viviparous female. Pale green. Eyes red. Antennæ longer than body, thin, green; apices of segments iii. to v. and all vi. dark brown ; iii. a little longer than iv. ; v. a little shorter than iv. ; vi. not quite so long as iv. + v. ; iii. with 4 sensoria in a line near base ; all segments but vi. with a few small pale hairs. Frontal tubercles large. Rostrum yellowish-green, broad, apex dusky, reaching past second coxæ. Legs long, thin, pale green ; apices of tibiæ and all tarsi dusky ; short, pale hairs on femora and tibiæ. Abdomen with a few short, pale hairs arising from small tubercles. Cornicles long, thin, slightly expanding basally, green with deep greenish-brown to brown apices ; apices reticulate over the dark area, the remainder faintly imbricated. Cauda pale, green, long and narrowish, 4 hairs each side ; the apical four curved at tips.

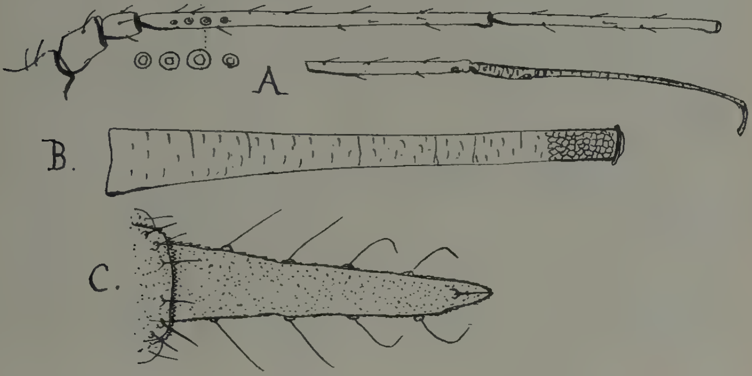

Fig. 59.—*Macrosiphum sileneum* Theobald.
A, Antenna ; B, Cornicle, and C, Cauda of apterous viviparous female.

Length 2.8 mm.

LOCALITIES. Wye, 10 viii. 11 ; 14 viii. 12 ; Lymington, viii. 15 (F.V.T.).

FOOD PLANT. *Silene inflata.*

Observations. Found as single specimens feeding inside the flowers of *Silene inflata.* A single female kept only produced four young in two weeks. The cornicles are very dark at the apex and the antennal sensoria are marked. No alatæ have been seen. It seems to be a very uncommon species.

MACROSIPHUM CENTRANTHI Theobald.

Theobald, Entomologist, XLVIII., p. 262 (1915).

Alate viviparous female. Head brown; pronotum with broad brown band; metathoracic lobes brown, and a spot below base of wings deep brown, ground-colour of thorax green to deep yellow-green. Abdomen bright green with three small dark lateral spots before cornicles and traces of some smaller ones above them. Eyes dark reddish-brown to brown. Antennæ deep brown. Cornicles black, except at base, where they are green. Legs black, except basal two-thirds of femora, which are green. Cauda rather long, acuminate, green. Antennæ longer than body, segment i. larger than ii.; iii. very slightly longer than iv., with 20 to 28 sensoria spread over whole length; iv. longer than v., the latter with normal sub-apical sensoria; vi. not as long as iv. + v. Proboscis reaching to or just beyond second coxæ, black at apex. Cornicles long, thin and cylindrical, about as long as antennal segment iii., the apex markedly reticulate; in some specimens the basal one-third of the cornicles may be dark green. Cauda with six long chætæ on one side, five the other, and two curved dorsal apically placed ones. Wings large; stigma yellowish-green; veins darker.

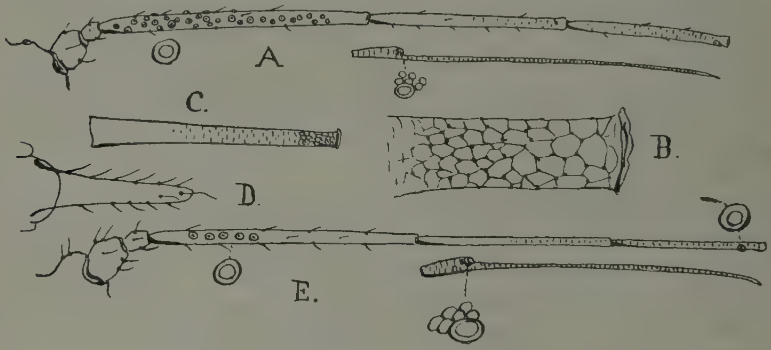

Fig. 60.—*Macrosiphum centranthi* Theobald.
A. Antenna; C. Cornicle; B. Further enlarged apex; D. Cauda of Alate ♀; E. Antenna of Apterous ♀.

Length 2.5 to 3 mm. *Wing expanse* 9 to 10 mm.

Apterous viviparous female. Green; apices of femora, tibiæ, proboscis and cornicles black, and all the tarsi black. Antennæ long, brown, except the two basal segments, which are green, iv. to vi. darker than iii.; segment i. nearly twice as long and wider than ii.; iii. longer than iv., but not as long as vi., with 3 to 5 sensoria close together near base; apex darker than remainder; iv. longer than v., imbricated, with the usual sub-apical sensorium close to its apex; vi. not quite as long as iv. + v.; antennal hairs simple and slightly capitate. Rostrum green, dark at apex, reaching nearly to or just past third coxæ; broad, the last two segments short. Legs long, green, apices of femora with broad black areas; narrower apical dark bands on tibiæ and black tarsi; femora with a few hairs on each side, tibiæ with many more. Cauda long, about half length of cornicles, bluntly acuminate, green, with six pairs of lateral hairs and two median dorsal ones near the apex, the apical one curved towards the tip. Anal plate green. Cornicles long, about as long as third antennal segment rather thin and cylindrical, slightly curved outwards, green, black at apices, or dark brown and black at apices; the dark area at the apex with large marked reticulations, remainder faintly imbricated.

Length 2.5 to 3 mm.

FOOD PLANTS. Red valerian (*Centranthus ruber*) and common valerian (*Valeriana officinalis*).

LOCALITIES. Ramsgate and Margate, May 20th, 1914; Wye, June 30th, 1914; Windermere, June 16th, 1914 (Rymer Roberts).

Observations. I first found this aphid in dense masses on the red valerian on the chalk cliffs at Ramsgate and Margate on May 20th. They were then all apteræ with a few nymphæ. I took home some large colonies, and on the next day some became alate viviparous females, and on the 23rd alatæ swarmed. They continued to become alate until the 30th. I transferred many of these alatæ to peas (*Pisum*) and bramble (*Rubus*), and they seemed to settle on both, but none of the larvæ produced on both plants lived. It was thought that then this species might be the same as the *M. pisi* of Kaltenbach. It has since proved to be quite distinct. On June 30th I found it at Wye on red and white cultivated valerians (*Centranthus*), when all were apteræ, many being immature. These were watched, and alatæ appeared on July 16th.

The valerian species is markedly mealy in larval and nymphal stages, and so are many of the apterous viviparous females.

The young are yellow or pale green. The nymphæ are yellow-green and mealy with a dark central line ; antennæ pale brown, dark on apical half, and are carried over the body, ; legs pale brown, except base of the femora ; apex of tibiæ and tarsi dark ; cornicles long, thin, cylindrical, and dusky ; eyes black.

In 1903 Clarke described a *Macrosiphum valerianiæ* in California (Canad. Entom., XXXV., p. 253). I at first considered that the British species was the same, but as Clarke describes the apterous viviparous female as being yellow-brown and with black nectaries, and the general colour of the abdomen of the alate female as yellow-brown, I have described the insects I have found as a distinct species. I should not be surprised, however, if they proved to be the same, a point which can only be decided by a comparison of American and British specimens.

Schouteden (Ann. Soc. Ent. Belg. 47, p. 190, 1903) records *Aphis viburni*, Scopoli, from *Valeriana officinalis.* Tavares (Brotéria, S. Fiel. vi. Le Zool., p. 113) a black Aphid from *Centranthus caleitrapa*, Lichtenstein (Les Pucerons, p. 131) records *Siphonophora rosæ*, Linn., and *Aphis papaveris* Fabr., from *Centranthus*, and the former from *Valeriana* (p. 140).

MACROSIPHUM PHILLIPSII Theobald.

Ent. Mo. Mag., LXI., 79 (1925).

Apterous viviparous female. Large, elongate, oval, narrowed in front and posteriorly ; antennæ not quite so long as body and much darker evidently deep brown ; segment i. much larger than ii. ; iii. long, about as long as iv. + v., with 45 to 50 round sensoria of unequal size, a few nearly oval, extending almost to apex of segment, with 10 hairs one side and 3 the other ; iv. about same length as to slightly more than v., 2 hairs each side and several on surface ; v. with 2 hairs one side, 1 the other ; vi. not so long as iii. ; sensoria on v. and vi. normal. Rostrum reaches near or quite to third coxæ. Cornicles black, cylindrical, rather thick, expanding basally ; apices reticulate, remainder strongly imbricate. Cauda pale, long, acuminate, about three-quarters length of cornicles ; 6 hairs one side, 7 to 8 the other, and a few on surface. Anal plate dark. Body with stout hairs, arising from pale mammillæ on dark areas. Legs evidently same colour as

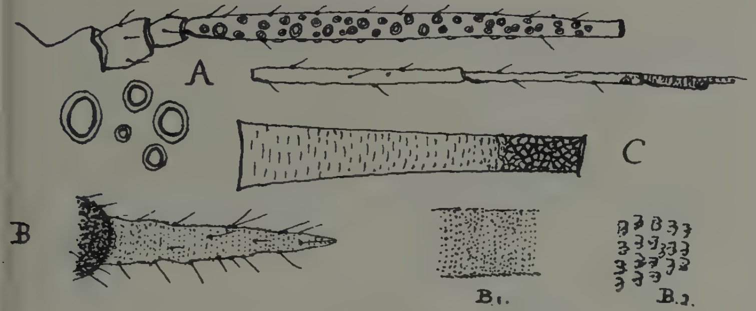

Fig. 61.—*Macrosiphum phillipsii* Theobald.
Apterous viviparous female. A. Head and Antenna; B. Cauda; C. Cornicle; B1 and B2 Ornamentation of Cauda and Anal plate.

body, apices of femora and tibiæ and all the tarsi dark; both femora and tibiæ with rather stiff scanty hairs.

Length 3 to 3.5 mm.

LOCALITY. New Ross, Co. Wexford, Ireland, 6 vii. 24.

Observations. Described from two perfect apterous females preserved in spirit collected by Mr. Phillips. It is a very marked species at once distinguished by antennal segment iii. having sensoria over its whole length. The specimens collected by Mr. Phillips bear only the label of locality and date, but the tube contained blossom buds and stalk of some Composite plant. Many larvæ also occurred in the tube, and on the blossom stalks and a *Myrmica* ant with them.

MACROSIPHUM CORALLINUM Theobald.

Ent. Mo. Mag., LXI., 73 (1925).

Apterous viviparous female. Bright pink, yellow legs, antennæ and cornicles. Antennæ dark at apices of segments iii. and iv.,

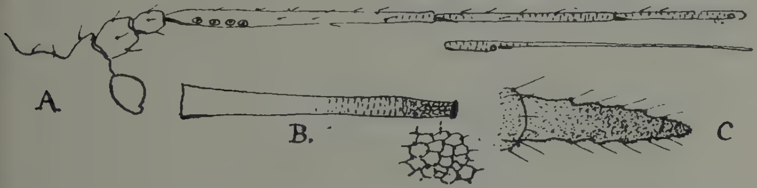

Fig. 62.—*Macrosiphum corallinum* Theobald.
A. Head and antenna; B. Cornicle; C. Cauda of apterous ♀.

and on all v. and vi.; apices of femora and tibiæ dark, also tarsi and apices of cornicles. Eyes dark. Antennæ longer than body; segment i. much larger than ii.; iii. not so long as iv., with 4 to 5 sensoria near base; iv. longer than v.; vi. with very long flagellum. Cornicles long and cylindrical, slightly expanding basally and swollen before dark apices; apices reticulate. Cauda green, 5 hairs each side, about half cornicles. Anal plate green, rather small, rounded. Rostrum reaching to second coxæ; apex dark. A few scattered hairs on body. Legs long and thin; tibiæ with many rather long hairs.

Length 3.5 mm.

FOOD PLANT. A wild Umbillifer.

LOCALITY. Horner, Porlock, 17 vi. 15.

Observations. Described from a perfect specimen sent me by Mr. Crawley, with a note that it was a most brilliant pink, with bright yellow legs and cornicles.

MACROSIPHUM GEI Koch.

Siphonophora gei Koch.
Siphonophora solanifolii Ashmead.
Macrosiphum solanifolii Patch, etc.
Nectarophora solanifolii Fletcher, etc.
Macrosiphum stellariæ Theobald.
Macrosiphum cholodkovskyi Mordwilko.
Macrosiphum epilobiellum Theobald.
Siphonophora ulmariæ Schouteden.
Macrosiphum ulmariæ Theobald.
Macrosiphum creelii Davis.
? *Macrosiphum venæfuscæ* Davis.

Koch, Die Pflanz, 171 (1855); Theobald. Trans. Sec. Cong. Ent., 386, III., XIV. and XV. Journ. Eco. Biol., VIII., 138, Fig. 45 (1913); (solanifolii), Ashmead, Canad. Ent., 14, p. 92 (1882); Fletcher, Ann. Rept. on Expt. Farms, 1904, p. 228 (1905); Patch, Me. Agri. Expt. Sta. Bull., 134, p. 215 (1907); Fletcher, Ann. Rept. Expt. Farms, 1906, p. 210 (1907); Patch, Me. Agr. Expt. Sta. Bull., 147, p. 225 (1907); Patch, Me. Agr. Expt. Sta. Bull., 190, p. 81 (1911); Davis, Journ. Eco. Ent., 4, p. 330 (1911); Davidson, Journ. Eco.

Ent., 5, p. 411 (1912); Patch, Me. Agri. Expt. Sta. Bull., 202, p. 178, (1912); Britton, 12th Rept. State Entomo. of Connecticut for 1912, p. 294 (1913); Patch, Me. Agri. Expt. Sta. Bull., 233 (1914); Webster, Agr. Expt. Sta. Iowa St. Col. Agric. and Mech. Arts. Bull., 155, p. 400 (1915); Patch, Me. Agric. Expt. Sta. Bull., 242 (1915); Theobald, Aphides attacking the Potato, Bull. I. Res. Dep., S.E.A. Coll., p. 4 (1922); Blanchard, Physis, V., 20, p. 190 (1922). (*stellariæ*), Theobald, Journ. Eco. Biol., VIII., 141 and 48 (1913); (*cholodkovskyi*), Mordwilko. Fn. d. l. Russe, I., 2, 459 (1919); Walker, Ann. Mag. Nat. Hist. Se., 2, II., 421 (1848); Del Guercio, Nuove Relaz. d. R. Staz, Ent. Agri. Firenze, I., 2, 165 (1900); Schouteden, Ann. Soc. Ent. Belg., XLIV., 16 (1900); Mèm. Soc. Ent. Belg., XII., 240 (1906); Theobald, Journ. Eco. Biol., VIII., 3, 137 (1913); V. d. Goot, Beit. z. Kennt. d. Holländischen Blattlause, 105 (1915); (*epilobiellum*) Theobald, Ann. Rept. Lancs. and Chesh. Ent. Soc. for 1921-22 (1923).

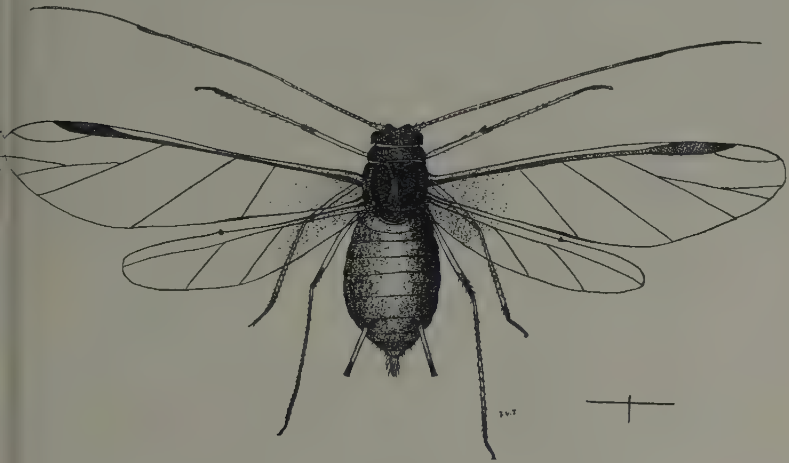

Fig. 63.—*Macrosiphum gei* Koch.
Alate viviparous female (from potato).

Alate viviparous female. Green or pink. Head yellowish-green. Thorax yellowish-green, lobes brownish. Cornicles green, apices darkened. Cauda pale green. Legs green; apices of femora and tibiæ dusky; tarsi dark. The pink forms have a pale yellowish head and the thorax yellowish-pink; abdomen pale pink; cornicles yellow and cauda pink. Antennæ longer than body; segment i. larger than ii.; iii. longer than iv.; iv. a little longer than v.; vi. not quite so long as iv. + v.; iii. with 16 to 20 sensoria in a single row, not quite reaching apex of segment. Cornicles reticulate at apices, cylindrical. Cauda ensiform, about half the length of cornicles; a few long lateral hairs and a medial sub-apical one. Rostrum green or pink, apex dusky, reaching to or just beyond second coxæ. Wing veins dark brown; stigma pale brown; insertions yellowish-green.

Length 2.9 to 3.3 mm.

Apterous viviparous female. Green or pink. Legs, antennæ, cornicles and cauda as in alate female. Rostrum reaches to second coxæ, in a few just beyond. Antennæ longer than body; segment i. much larger than ii.; iii. longer than iv.; iv. longer than v.; vi. about as long as iv. + v.; iii. with 1 to 7 round sensoria near the base, 5 being the normal number. Cornicles about as long as antennal segment iii.; apex reticulate for one-fifth to more of the length. Cauda ensiform, about half length of cornicles.

Length 4.0 to 4.1 mm.

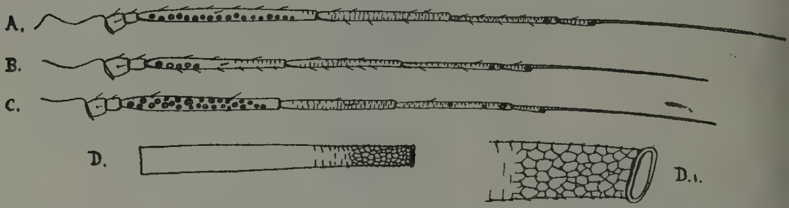

Fig. 64.—*Macrosiphum gei* Koch.
A. Head and antenna of alate female; B. of apterous female; C. of male; D. Cornicle (from potato).

Oviparous female. Apterous. Very pale, nearly white on head and thorax; abdomen pale pink, green or yellow; cornicles pale, except at apices. Cauda pink, ensiform. Legs pale, except apices of femora, and tibiæ and the tarsi. Antennæ longer than body; segment iii. longer than iv.; iv. a little longer than v.; vi. not quite so long as iv. + v.; iii. with 3 to 6 round sensoria near base. Cornicles cylindrical, apices reticulate and dark.

Legs with hind-tibiæ much shorter and darkened, with many sensoria.

Length 2.1 mm.

Male. Alate. Abdomen green to brown; head dark. Antennæ dark brown, darkest at apices. Cornicles pale brown, apices darkened. Antennæ much longer than body; segment i. much larger than ii.; iii. longer than iv.; iv. and v. same length; iii. with 37 to 40 sensoria over whole length, scantiest at apex; v. with 14 to 16 small sensoria in a broken row. Cornicles long, about half length of body, apices reticulate. Penis pale; opercula dark. Wings large; veins dark brown; stigma pale greyish-brown.

Length 1.1 to 1.6 mm.

FOOD PLANTS. *Spiræa ulmaria, S. filipendula; Stellaria graminea; Geum urbanum; Epilobium montanum; E. angustifolium*; Potato; Roses; also recorded from the following: *Zea mays*; *Iris sp.*; *Gladiolus sp.*; *Fagopyrum esculentum*; *Capsicum*; *Aubergines* (F.V.T.); *Lamium album* (Evans); Tomato; Soya Beans and *Atriplex* (Walton); *Chenopodium album*; *Amaranthus retroflexus*; *Brassica rapa*; *Capsella bursa-pastoris*; *Pyrus malus*; *Phaseolus vulgaris*; *Pisum sativum*; *Physalis sp.*; *Solanum jasminoides*; *Solanum melongena*; *Aster sp.*; *Lactuca sp.*; *Cineraria sp.*; *Sonchus oleraceus* (Patch); *Chrysanthemums* and *Belladonna* (F.V.T.); Hop (*Humulus lupulinus*); Yellow Horned Poppy (*Glaucium luteum*) (F.V.T.); *Tropæolum, Borago, Lilium, Veronica,* Marigold, *Colvolvulus, Chenopodium* sp. (F. Laing).

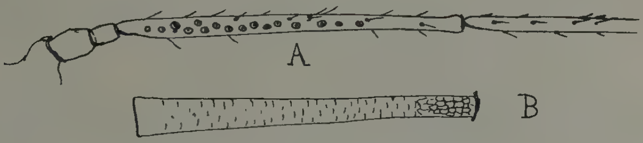

Fig. 65.—*Macrosiphum gei* Koch.
Alate ♀; Antenna A. and Cornicle B.
From *Stellaria* (=*stellariæ* Theo.).

LOCALITIES. Bangor, Conway, Ewloe Green (Walton); Windermere (Rymer Roberts); Huntly, Aberdeenshire, N.B. (Cotton); Port Seton, E. Lothian (Evans); Hastings; Woking;

Lincoln; York; Exeter; Torquay; Salcombe; Ventnor; Wye; Maidstone; Little Hadham; Cambridge; Newport; Long Melford, Suffolk (F.V.T.); Birmingham (Dallman); Aberystwyth, viii. 24 (Jenkins); Dublin (Carpenter); Aberdeen; Manchester; Midhurst; New Forest; Barnet; Rickmansworth, etc. (F. Laing); Canada (Fletcher); Florida; Maine; California, etc. (Patch, etc.). Very generally distributed over Great Britain.

Observations. This is a very common Green Fly in this country, where it is especially abundant on Potatoes, and now and then in numbers on Roses. It also occurs on many other plants.

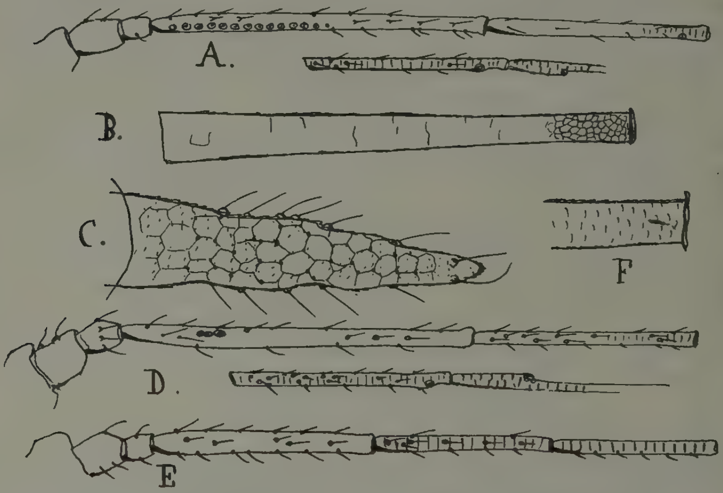

Fig. 66.—*Macrosiphum gei* Koch (from *Geum urbanum*).
A, B, and C, Antenna, cornicle and cauda of alate female; D, Antenna of apterous female; E and F, Antenna and apex of cornicle of nymph.

Specimens sent me from Egypt were referred to a possible new species which in MS. I referred to as *M. rosæollæ*, but which fortunately was never described (Bull. Ent. Res., VI., pt. ii., p. 111, 1915). Miss Patch records the life-history in America as follows:—"The green and pink aphid of the potato is found in spring upon rose bushes, feeding on the succulent growth and especially abundant near the flower-buds. Wingless as well as winged forms may migrate. These pass to the potatoes, upon which they increase enormously. A single female may produce more than fifty young in two weeks, and in warm weather these become mature in two weeks. By mid-September the fall migration is over and the aphides have deserted the potato fields. They may go to other plants, but the rose seems the favourite. The last generation of the year consists of wingless egg-laying females and alate males, which appear in Maine about September the 21st. The rose is evidently the favourite over wintering plant and they occur in colonies upon roses up to July and by this time the summer generation may be found on the potato." In this country I have found it in great numbers on the leaf and blossom stalks and a few on the leaves of the potato which they cause to shrivel up, especially the young and tender leaves and now and then the haulm also dies away from their constant punctures. In dry weather much honey dew is execreted and the foliage gets scorched by it. I have never seen it do any damage on roses, although it is frequent on them. The range of food plants is very varied and it may occur in the asexual stage right through the winter under glass. It appears to be widely spread over Great Britain. Although it does not do so much harm to potatoes as *Myzus persicæ* it nevertheless is a very serious potato pest in some years. Recently I have received it from North Ireland, where it was living (March 22nd) on the sprouts of Potato Seed, just as is done by *Myzus persicæ* and *Myzus pseudosolani*. This seems to point to the fact that it may winter in the egg stage on the potato as well as on the rose. I have frequently found Aphid eggs on the

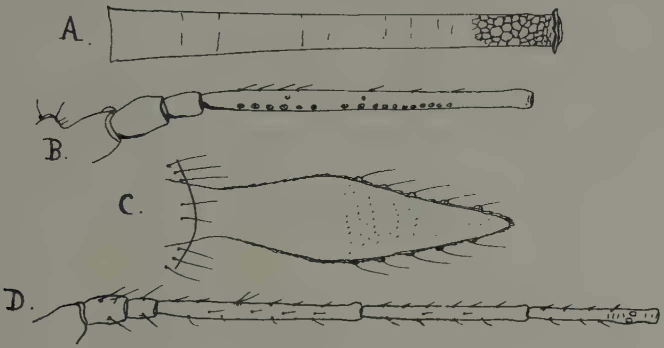

Fig. 67.—*Macrosiphum gei* Koch (*cholodkovskyi* Mordwilko). Alate ♀; Cornicle A.; Antenna B.; Cauda C. and D. Antenna of apterous ♀.

tubers, but these all proved to be *Myzus persicæ*. Mr. C. L. Walton has found it feeding on *Atriplex* amongst potatoes in N. Wales, and the late Mr. Evans in numbers on *Lamium album* in Scotland, in both cases the insects were in all stages on the plants. The common Green *Macrosiphum* on *Iris*, both wild and cultivated, is the same. I found it in abundance on Wild Iris at Lymington in June, 1921, and on cultivated *Iris* at Wye in June, 1920, in both instances they were cleared off by *Syrphid* larvæ.

Ashmead's type seems to have been lost. It is extremely variable and hence has been described under varied names. On going over long series I feel sure that the sinking of such names as *solanifolii*, *cholodkovskyi* and my *stellariæ* and *epilobiellum* under *gei* is correct. I have examined carefully my specimens of Davis' *creelii* and find it also the same; his *venæfuscæ* is also apparently this species. It is to be regretted that such a well-known name as *solanifolii* should have to disappear from literature, but the rule of priority does not permit of its retention, and though *gei* is retained here, it is quite possible that it may have to give place in the future to *solani* Kalt. An excellent account of it is given by Miss E. Patch (Bull. 242, Maine Agri. Exp. Station, U.S.A., 1915).

If Aphids play any part in the Mosaic disease of the Potato, this is probably one of the chief species. In 1925 several hop gardens in Kent became infested with this Aphid, which bred and flourished for a time.

MACROSIPHUM LINEATUM V. d. Goot.

Macrosiphoniella lineata V. d. G.

Van der Goot, Tijdsch. v. Ent., LV., 59 (1912); Laing, Ent. Mon. Mag. (3), IX., 239 (1923).

Apterous viviparous female. Green to yellowish-green, with some deeper green lines and markings; antennæ brownish, darkened at apices; legs green, apices of tibiæ and the tarsi dark; cornicles green, dusky at apices; cauda green. Antennæ longer than body. Cornicles long, cylindrical, expanding towards apex and somewhat constricted at base on one side, rather narrow. Cauda very large and broad, somewhat shorter than cornicles. Basal segment of antennæ much larger than ii. and iii. slightly shorter than iv., with 5 to 12 round sensoria of unequal size on basal region; iv. a little longer than v.; vi. with basal area more than one-third of v. ; flagellum longer than iii. Cauda large, quite four times as wide as cornicles, blunt at apex, with numerous fine hairs and finely spinose. Cornicles reticulate at apices. Rostrum reaching to second coxæ. Eyes large, reddish-brown.

Length 5 mm.

Alate viviparous female. Green ; head and thorax brown ; abdomen with dark green lines. Eyes red. Antennæ brown, last three segments darkened. Legs bright green ; tarsi and apices of femora and tibia dark. Cauda green. Cornicles green at bases, apices dark. Antennæ longer than body ; segment i. larger than ii. ; iii. and iv. equal ; iii. with 25 to 33 unequal sized sensoria, extending nearly to apex ; iv. longer than v., basal area of vi. about one-third of v. ; flagellum longer than iii. Cornicles, cauda and anal plate as in apterous female. Rostrum reaches second coxæ. Some antennal hairs capitate. Wings normal. Legs as in apterous female.

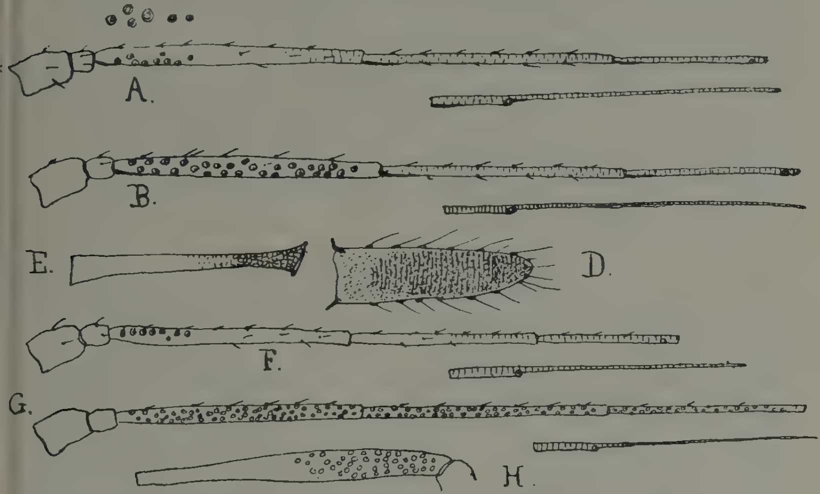

Fig. 68.—*Macrosiphum lineatum* V.d. Goot.
A. Antenna of Apt. ♀; B. Antenna ; E. Cornicle ; D. Cauda of Alate ♀; F. Antenna ; H. hind tibia of Oviparous ♀; G. Antenna of Wingless ♂ (F. G. H. after V.d. Goot).

Length 4.2 to 5.2 mm.

Oviparous female. (Apterous.) "Körper wie beim viviparen Weibchen gefärbt, nur die Grundfarbe meist ein etwas helleres grün. Körper länglich oval etwas gewölbt, mit Querreihen kurzer Härchen. Fühler länger als der Körper, Längenverhältniss der letzten Glieder etwa wie 52. 50. 45. 18. 60. Das 3 Glied trägt an der unteren Hälfte 8-12 rundliche Riechplatten, Rüssel, Siphunculi, Analteile etc. wie beim ungeflügelten viviparen Weibchen gestaltet. Die Schienen des hinteren Beinpaares sind nur wenig verdickt und tragen an der basalen Hälfte ringsum etwa 40 Sensoriën. Es gibt bei dieser Art, wie ich auch bei vielen anderen Arten zu beobachten Gelegenheit hatte, Intermediärformen zwischen parthenogenetischen und amphigonen Weibchen. Diese Zwischenformen gleichen am meisten den viviparen Weibchen; die hinteren Schienen, welche hier nicht verdickt sind, tragen aber einige Sensoriën, die oft schlecht ausgebildet sind. Der Körper scheint nur wenige Embryonen zu enthalten; vielleicht sind neben denselben auch Eier anwesend, wie S. J. Hunter bei *Toxoptera graminum* Rondani gefunden hat.

Length 4.3 to 4.5 mm.

Male. Wingless. "Körper sanft rötlich gefärbt; über den Rücken läuft meist ein breiter, schwarzgrüner Längsstreifen. Der Körper ist meist ein wenig bereift. Augen bräunlich schwarz. Fühler schwarz, das 3^e Glied an der Basis hellbraun. Beine hell gelblich braun, Tars und Schienenspitze schwarz. Siphunculi gelblich braun, mit schwarzer Spitze; Cauda sanft rötlich. Körper länglich oval, schmal, mit Querreihen kurzer Härchen auf dem Hinterleibe. Fühler viel länger als der Körper; Längenverhaltniss der letzten Glieder wie 50. 55. 50. 18. 55. Alle diese Glieder tragen rundliche, kleine Riechplatten; ihre Zähl ist meist iii. 60; iv. ± 45; v. 25 + 1; vi. 1 (+4-6). Rüssel, Siphunculi und Cauda ungefähr wie beim viviparen Weibchen. Die Genitalplatte wie gewöhnlich mit gut ausgebildeten "Haftzangen."

Food Plants. *Artemisia vulgaris* and *Artemisia sp?* and *Chrysanthemum frutescens.*

Localities. Grounds of Natural History Museum, South Kensington, vi. 23 (F. Laing); Wageningen, Bussun, Holland (V. d. Goot).

Observations. Redescribed in the alate and apterous viviparous female stages from specimens given me by Mr. F. Laing, taken in the grounds of the Natural History Museum, South Kensington. I have not seen the sexuales so append Van der Goot's original descriptions and figures.

MACROSIPHUM GALIOPHAGUM Wimshurst.

Ent. Mo. Mag., LX., 62 (1923).

Alate viviparous female. Bright green and shiny; antennæ darkened except first three segments. Cornicles dusky at their apices; the apices of the tibiæ and the tarsi dark. Antennæ about half as long again as the body; segment i. much larger than ii.; iii. very slightly longer than iv., with three sensoria only, on its lower half; iv. a little longer than v.; vi. about as long as iv. + v., its basal portion not quite as long as v. Cornicles long and cylindrical, reticulate at apices, about twice as thick as the antennal segment iii. and about as long. Cauda half as long as the cornicles, spinose all over, cylindrical, but with a bulge in the middle; three hairs on each side. Proboscis darkish at tip, fairly broad and about as long as antennal segment iii., and not quite reaching second coxæ.

Length 2 mm.

Apterous viviparous female. Bright green and shiny; immature specimens have a blue-green bloom on them. Offspring clearly visible within abdomen of mother, as their bright red eyes render them very conspicuous. Antennæ dark at tip, light yellow at base, a little longer than body. Basal segment of antenna larger than ii.; iii. same length as iv., which is longer than v., but not so long as vi.; vi. a little longer than iv. + v., its basal portion is just half as long as v., and not quite a quarter of the whole length of vi. Cornicles thicker and a little longer than antennal segment iii.; dusky at tip and reticulate. Cauda long, green and narrow, half as long as the cornicles, spinose with three hairs on each side. Legs fairly long; coxæ and femora light green, tibiæ yellowish-brown with slightly dusky tips, tarsi dark.

Length 2.25 mm.

FOOD PLANT. Goose grass or Cleavers (*Galium aparine*).

LOCALITY. Brenchley, Kent, 18 vii. 1923-30 vii. 23, then only on pot plants indoors.

This aphis differs from all other species of *Macrosiphum* by the fact that the third antennal segment of the alate viviparous female bears only three sensoria. Miss Wimshurst says: "Alate females were found breeding freely on this plant throughout July. The plants began to die down at the beginning of August, and I could find no more of this aphis in the hedge rows after the end of July, though several established themselves on plants I had potted and brought indoors for the purpose of watching another Aphid, and there continued breeding freely until the end of October." On July 13th, 1925, Miss Wimshurst sent me a colony, which consisted of a few alatæ, nymphæ, apteræ and larvæ.

MACROSIPHUM FORMICARIUM Theobald.

Theobald Ent. Rec., XXVII., 3, 55 (1913).

Alate viviparous female. Head dark brown. Antennæ much longer than the body; basal segment brown, much longer than ii., which is pale; rest of antenna dark brown, except just the base of iii.; iii. a little longer than iv., with about twenty sensoria over about two-thirds of its length; iv. longer than v., which has a large sub-apical sensorium; hairs scanty, rather long and stiff. Eyes black. Proboscis pale, black at the apex, reaching to the second coxæ. Thorax dark. Abdomen pale with dark lateral spots from which arise longish hairs from distinct tubercles; over the rest of the abdomen also arise straight stiff hairs from pale tubercles. Cornicles very long, cylindrical, slightly swollen at the base, dark, except just at the base, reticulate for the greater part of their length, markedly imbricated near the base, which is unadorned. Cauda large, bluntly lanceolate, pale with three large pale hairs on each side and two median sub-apical ones. Legs moderately long, pale yellowish-green with dark areas at the apices of the femora and tibiæ and dark tarsi; rather long,

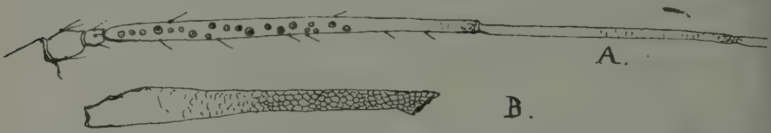

Fig. 69.—*Macrosiphum formicarium* Theobald.
A. Antenna; B. Cornicle, Alate ♀.

stiff hairs on the femora and tibiæ. Wings ample, with brown veins, pale brown stigma and pale insertions.

Length 2.3 mm.; wing expanse 7 mm.

LOCALITY. Lundy Island, 9 vi. 1913 (Donisthorpe).

Observations. Described from a single specimen taken by Mr. Donisthorpe in a nest of *Lasius flavus.* The cornicles are very long, and peculiar in that they are reticulate over nearly their whole length; the stiff hairs on the body are also characteristic. As the specimen had been for some time in spirit, it is not possible to give the actual coloration. Koch describes an underground Macrosiphum as *Siphonophora subterranea*, but this species has shorter cornicles and a black cauda.

MACROSIPHUM URTICÆ Schrank.

Aphis urticæ Schrank.
Siphonophora urticæ Koch, Buckton.
Siphonophora carnosa Buckton.
Acyrthosiphon (*Microlophium*) *urticæ* Mordwilko.

Schrank, Fn. Boica, II., 106, 1188 (1801); Kaltenbach, Mono. Pflanz, 13 (1843); Koch, Die Pflanz, 154, fig. 208, 209 (1855); Mono. Brit. Aphid, I., 143, pl. XIX. and XX. (1875); Theobald, Journ. Eco. Biol., VIII., 132, fig. 42 (1913); Mordwilko, Fn. d. l. Russe., I., 200, 18, figs. 87 to 90 (1914). Blanchard, Physis., V., 20, p. 194 (1922).

Alate viviparous female. Shiny green; head, pronotal band, thoracic lobes and scutellum black. Eyes red. Antennæ longer than body, dark; segments i. and ii. and base of iii. pale greenish; iii. with twenty to thirty-two rather small sensoria, mainly along one side.* Abdomen showing three more or less distinct black lateral spots. Cornicles long, thin, cylindrical, but expanded just at base, green, some dusky at apex; at apex are a few transverse long reticulations; rest faintly imbricated. Legs yellowish-green; apices of tibiæ and the tarsi dusky; tibiæ hairy; femora with a few hairs. Wing insertions pale green; stigma pale brown.

Length 3 to 3.5 mm.

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* Blanchard says 20 in the Argentine.

Apterous viviparous female. Green; rather shiny; pyriform. Eyes red-brown. Antennæ as long or longer than body, green, apices of segments iii. to v. dusky; vi. dark; iii. with 3 to 6 rather small sensoria close together, near base. Cauda long, green. Cornicles very long; green; thin and cylindrical slightly expanded at the base; the apex with a few large transversely elongate reticulations; the remainder faintly imbricated. Legs green to yellowish-green; apices of the tibiæ and the tarsi dusky; femora and especially the tibiæ hairy.

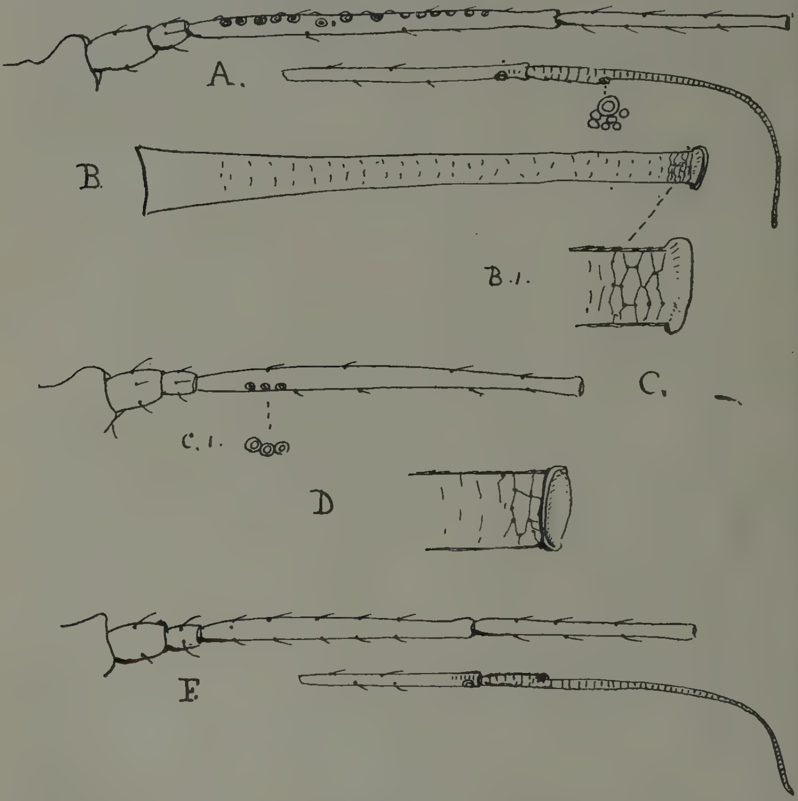

Fig. 70.—*Macrosiphum urticæ* Schrank.
A and B. Antenna and cornicle of alate female. C. Antenna of apterous female; c.i., sensoria; D. Apex of cornicle of apterous female; F. Antenna of larva.

Length 3.3 to 3.8 mm.

Male. Alate. Yellowish-green; head and thorax brown with intersegmental divisions yellow. Abdomen yellowish green, with transverse black bars and black lateral spots. Legs light brown, apex of tibiæ and all the tarsi dark brown. Cauda yellowish-green. Cornicles brownish-green. Antennæ brown, longer than body; basal segment much larger than ii.; iii. long, much longer than iv., with 42 to 50 sensoria along one side; extending to apex; iv. very slightly longer than v., with no sensoria; v. with a row of sensoria along one side; vi. with long

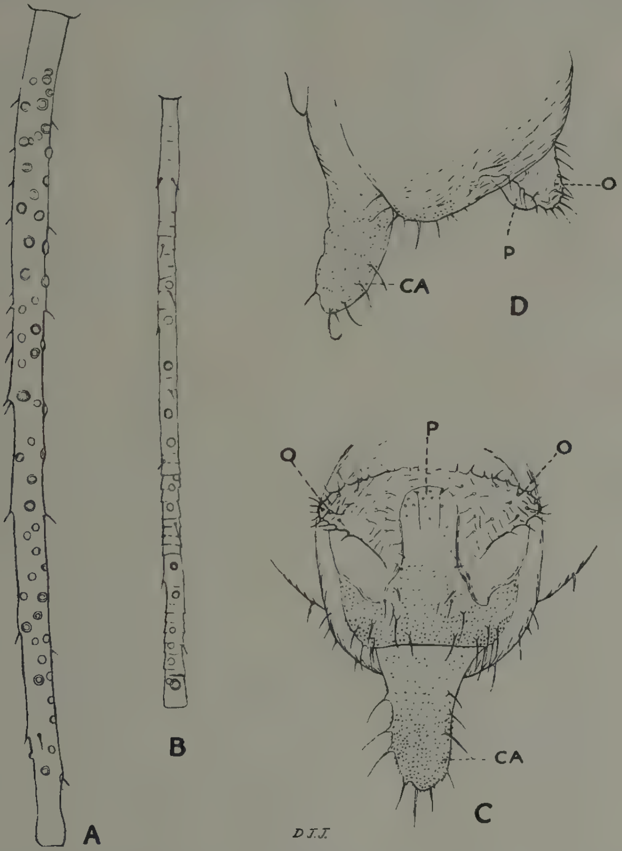

Fig. 71.—*Macrosiphum urticæ* Schrank.
A. Antennal segment III. of ♂; B. Segment V. of same; C. venter of ♂ abdomen; CA. Cauda; O. Opercula; P. Penis; D. Lateral view of same (Jackson).

flagellum. Rostrum reaches second coxæ. Cornicles, thin, cylindrical, about as long, but thicker than antennal segment iv., somewhat enlarged at base; apex with a few reticulations. Penis prominent, blunt, its sheath darkened; claspers with long hairs. Tibiæ hairy. Wings normal.

Length 3.5 to 4.0 mm.

FOOD PLANTS. *Urtica dioica*; *Geranium sp?*; *Geranium robertianum*; *Malva sylvestris*; *Chelidonium majus* (Walker).* I have only found it on the Common Stinging Nettle with a single exception of two apteræ on a wild *Geranium sp?*

LOCALITIES. Chandler's Ford, New Forest (iv. 12) (Duffield); Wye (29 vi. 04; 7 vii. 09; 3 vi. 10; 17 vi. and 24 viii. 12); Ealing (2 vi. 84); Hastings (4 vi. 88); Ventnor (2 v. 11); Cambridge (7 v. 89); Kingston-on-Thames (vii. 84); Okehampton and Teignmouth (v. 08); Fowey, Cornwall (7 v. 08), (F.V.T.); Windermere (Rymer Roberts); Criccieth, North Wales (7 viii. 01) (F.V.T.); Inversan, Invershin, N.B. (6 ix. 20) (D. J. Jackson). Birmingham district and N.E. Scotland, common (Laing). Probably found everywhere in Britain and general in Europe. Buenos Aires (Blanchard).

Observations. This very common species may be found on the Stinging Nettle from the end of April to November and in mild winters it may continue through to the following spring. It frequently appears in vast numbers, notably in 1884 and 1911. So far I have not myself found any sexuales, but Miss D. Jackson has found the male in Scotland, specimens of which she has kindly sent me. There is some variation in colour in the apteræ. Some are all green, others show darker stripes down the body and some are deeper coloured than others; some are distinctly farinose. Buckton describes two varieties of the apteræ, viz. (*a*) the typical one described, and (*b*) as being "Dull, somewhat hoary, punctured. No green dorsal or lateral stripes. Not pilose." Miss Jackson also notes the great variation in colour of the apterous viviparous females taken at the same time as the males and records three

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* Mr. Laing adds this note "One slide in the Walker Coll. in the Hope Mus. of *urticæ* from *Geranium robertianum* contains only immature apteræ and it is impossible to say what they are. There are no slides in the B.M. or H.M., Oxford, from *Chelidonium majus* and Walker's record is open to grave suspicion."

varieties as follows: Var. A.: Entirely green, legs pale green, tibiæ brownish-green; cauda green; cornicles pale green; antennæ brownish-green, basal segments green.

Var. B.: Entirely pale pink, eyes reddish-brown, cornicles yellowish-green, antennæ and legs like A.

Var. C.: Dark greenish grey or dark purplish red, covered with white tomentum, excepting the transverse spots and bars across the body, which are body colour, uncovered with tomentum and appear like dark stripes across the body. Cornicles and legs dingy green.

Schouteden places Buckton's *Siphonophora carnosa* as a variety of this species. As far as I can see it is quite similar in structure, but appears later in the year.

Colonies of *urticæ* are readily seen by the quantity of exuviæ on the upper surface of the nettle leaves. I have frequently noticed that in May great numbers of *Bibionidæ* are attracted by the honey-dew, which they imbibe from the leaves.

Blanchard (Physis. Buenos Aires, XX., July, 1922) records it on *Urtica, Malva* and *Geranium*.

MACROSIPHUM EUPHORBIELLUM Theobald.

Theobald, Entomologist, L., 79, 25 (1917).

Apterous viviparous female. Pink, semi-transparent; the antennæ pale, longer than the body; segment i. larger than ii.; iii. longer than iv., with two oval sensoria near the base; iv. about as long as v.; flagellum very pale; a few scanty hairs on first three segments. Eyes black. Proboscis pale, rather thick, reaching to about third coxæ. Cornicles pale pink, faintly dusky at apex, about one-third length of body, cylindrical, projecting beyond the cauda; apex faintly reticulate, very indistinctly imbricated on the remainder. Cauda pale pinkish-white, delicate in texture, very faintly spinose, rather thick and bluntly pointed, about half the length of the cornicles, with four pairs of pale lateral hairs and three dorsal ones near apex. Legs pale pinkish, rather long and thick; tibiæ with numerous short pale hairs, a few on femora.

Length. 1.8 to 2 mm.

FOOD PLANT. Spurge (*Euphorbia esula*).

LOCALITY. King's Wood, near Wye, 25 iv. 16.

Observations. I found a single colony of this very pretty pink aphid living in the young flower tufts of the Spurge. The young were pale semi-translucent pink. It is an extremely sluggish species, with the antennæ carried well over the back in repose.

I cannot identify it with any Aphid so far described from *Euphorbia*, namely *Macrosiphum cyparissiæ* Koch; *Macrosiphum* (*Acyrthosiphum*) *cyparissiæ propinquum* Mordwilko; *Aphis euphorbiæ* Kaltenbach and *Aphis euphorbiæ* Walker, the latter a pale saffron coloured species with short antennæ. It differs from my *Macrosiphum amygdaloides* in the pale cornicles, general colour and in the antennæ.

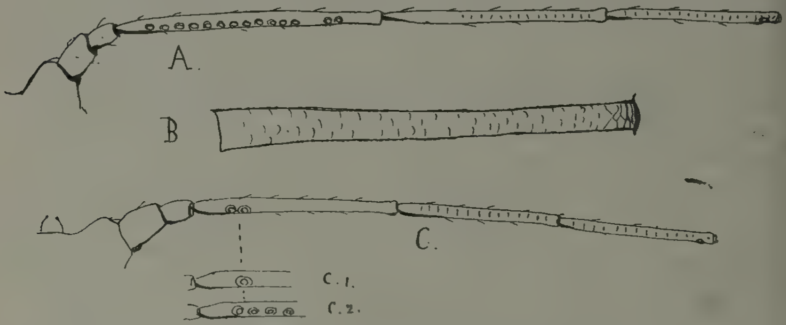

Fig. 72.—*Macrosiphum pelargonii* Kaltenbach.
Alate ♀; Antenna A.; Cornicle B.; Apterous ♀;
Antenna C., C1. and C.2. variations in sensoria.

MACROSIPHUM PELARGONII Kaltenbach.

Aphis pelargonii Kaltenbach.
? *Aphis malvæ* Mosley.
Aphis pallida Walker.
Siphonophora pelargonii Koch.
Macrosiphum malvæ Theobald.
Macrosiphum pelargonii Theobald.

Kaltenbach, Mono. Pflanz, 21 (1843); Mosley, Gard. Chron., I., 684 (1841); Koch, Die Pflanz, 193, figs; 265-266 (1855); Walker, Ann. Nat. Hist. Se., II., 430, 54 (1848); Buckton, Mono. Brit. Aphid., I., 136, pl. XV. (1877); Theobald, Journ. Eco. Biol., VIII., 131 (1913) (*malvæ*); Walker, Ann. Nat. Hist. Se., II., 429, 53 (1848); Zoologist, VII., App. xlvii. (1849).

Alate viviparous female. Green; head and thoracic lobes pale brown to brownish-yellow, in some the head is reddish-brown. Antennæ longer than body; greenish-yellow to pale greenish-brown, some green at base, others at base of segment iii., latter with 13 to 25 sensoria, reaching nearly to apex, of varied sizes and arranged mainly in a line; iv. a little shorter than iii.; iv. a little longer than v.; vi. not quite so long as iv. + v. (a little longer in *malva* form). Eyes deep red to black. Cornicles long, thin, pale green to yellowish-green, apices dusky, where there are a few reticulations and striæ, reaching beyond the cauda; cauda pale yellowish-green, moderately long, 4 hairs each side and one dorso-apical one. Legs rather long, pale yellow-green, apices of femora and tibiæ dusky; tarsi dark. Wings with green to pale yellowish-brown insertions; cubitus and stigma same colour.

Length 2 to 2.5 mm.

Apterous viviparous female. Pale yellowish-green to various shades of green, some dull, others shiny. Antennæ very long, longer than body; apices of segments dusky and a darkened area often around the group of sensoria on vi.; apical segment usually dusky; iii. with 1 to 5 sensoria near base; iii. longer than iv.; iv. a little longer than v. Cornicles pallid green to yellowish-green, cylindrical, long and thin, apices dusky, some faint apical reticulations. Cauda pale yellowish-green, moderate size; four hairs each side. Rostrum green, apex dusky, reaching to second coxæ. Legs pale yellowish-green; apices of tibiæ and the tarsi dusky, a few short hairs on femora, many on tibiæ; in some the apical banding is faint or almost absent.

Length 2.5 to 3 mm.

FOOD PLANTS. Geraniums; Chrysanthemums; Cinerareas; Arum Lilies; Malvas; Persimmon and Tomato (under glass); wild geraniums; and *Malva sylvestris*; *Mespilus germanicus* (Buckton ?); Chickweed (Walton); Columbine (Walker); Balsam in greenhouse (Walker).

LOCALITIES. Widely distributed over Britain.

OBSERVATIONS. Very like a *Myzus* in general appearance, but easily told by the divergent frontal tubercles. Under glass it is often found with *Myzus circumflexus* Buckton, and *Myzus* *persicæ* Sulzer. Walker's *Aphis pallida* is the same. Exactly what Mosley's *malvæ* is we cannot say.

MACROSIPHUM KALTENBACHII Schouteden.

Siphonophora alliariæ Koch.

Koch Die Pflanz, 177, figs. 243-244 (not 160, figs. 217-219), (1855); Buckton, Mono. Brit. Aphid., I., 123, pl. X., figs. 4-6 (1875); Schouteden, Mém. Soc. Ent. Belg., XII., 237 (1906); Theobald, Journ. Eco. Biol., VIII., 2, 84, fig. 21 (1913).

Alate viviparous female. Green to dark green; head, band on pronotum and thoracic lobes black. Antennæ longer than body, deep brown to black, paler at base of segment iii., which has 40 to 50 sensoria, extending the whole length; iv. shorter than iii., with 7 to 9 sensoria on one side; v. slightly shorter than iv.; vi. long and thin, with a very small and swollen basal area, whole segment much longer than iv. + v. Eyes black. The green abdomen has four irregular broken black transverse bands, sometimes represented by four pairs of transversely elongate lateral spots; three large black spots on each side, a large dark patch behind each cornicle and some other dark markings (bars and spots) behind. Hairs arising from small black tubercles. Cauda black. Cornicles black, thin, cylindrical and moderately long, apices with a few transverse lines and cross lines. Legs yellowish;

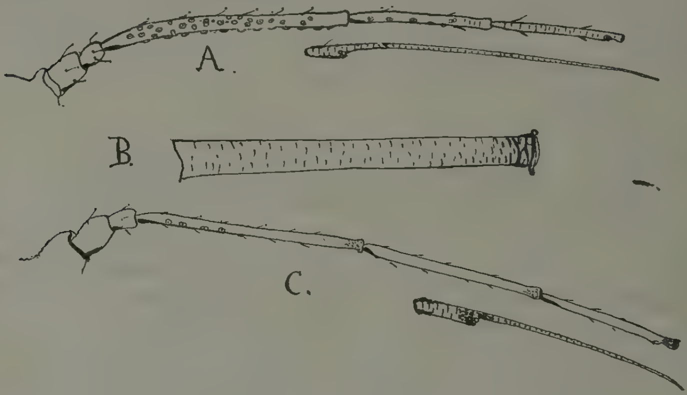

Fig. 73.—*Macrosiphum kaltenbachii* Schouteden.
Alate ♀; Antenna A. and Cornicle B.; C. Antenna of Apterous ♀.

femora and tibiæ with broad dark apical bands and tarsi dark; tibiæ with many fine, short hairs. Wings with yellow insertions and yellow-grey to grey stigma. Rostrum reaching to second or third coxæ.

Length 2.2 to 2.7 mm.

Apterous viviparous female. Green, somewhat shiny. Antennæ as long or a little longer than body; apices of segments iii. to v. and around the sensoria on vi. dusky; flagellum pale brown; iii. with 2 to 4 sensoria near base and short, slightly capitate hairs; iv. shorter than iii.; v. shorter than iv.; vi. not quite so long as iv. + v. Cornicles long, thin, cylindrical, expanded at base; a few large reticulations at apices. Cauda long, pale yellowish-green. Legs yellowish with dark apices to tibiæ; tarsi dark; small pale hairs on tibiæ.

Length 2.5 to 3. mm.

FOOD PLANTS. *Lapsana communis* (Buckton); *Alliaria officinalis*; *Sonchus macrophyllus* (Schouteden).

LOCALITIES. Cambridge, 7 vi. 94; Sidmouth, 4 vi. 09; Corfe, 2 v. 11; Wye, 22 v. 12 (F.V.T.); Barcorie, N.B., 3 viii. 17 (D. Jackson); Brussels (Schouteden).

Observations. Found in abundance in both stages in May on Garlic Mustard (*Alliaria officinale*), under the leaves. Buckton records it as very numerous in early June under the leaves of the Nipple Wort. Koch described two species as *alliariæ*, one on page 160, figs. 217 and 219, and the present species on page 177 which has priority. Schouteden proposed the name *kaltenbachii* for the second. I am inclined to think that the *alliariæ* on page 160 is the same as Buckton's *olivata*. The alate form of *kaltenbachii* is very marked. The apteræ are obscure and there is some variation in the number of sensoria on segment iii. of the antennæ. Buckton figures the cornicles of the apteræ as black (pl. X.), but in the text he describes them as green.

MACROSIPHUM PISI Kaltenbach.

Aphis pisi Kaltenbach.
Siphonophora pisi Koch, Buckton.
Nectarophora destructor Johnson.
Aphis pisum Harris.

Nectarophora pisi Sanderson, Oestlund.
? *Aphis lathyri* Mosley, Walker.
? *Aphis onobrychidis* Boyer.
Macrosiphum trifolii Pergande (non Theobald).
Acyrthosiphon pisi (Mordwilko).

Kaltenbach, Mono. Pflanz, 23 (1843) ; Koch, Die Pflanz, 190, figs. 261-262 (1855) ; Mosley, Gard. Chron., I., 684 (1841) ; Walker Cat. Hom. (B.M.), IV., 966 (1858) ; Harris, Exposit. Engl. Ins., 66, pl. 17, figs. 10-12 (1782) ; Boyer de Fonscolombe, Ann. Soc. Ent. Fr., X., 169, 9 (1872) ; Mordwilko, Fn. d. l. Russe, 83, figs. 50-65 (1914) ; Theobald, Trans. Sec. International Congress, Entomo., 380-393, pls. 14, 15 (1913) ; Theobald, Journ. Eco. Biol., V., No. 3, 134-136, fig. 43 (1913) ; Buckton, Mono. Brit. Aphid., I., 134-135 (1876) ; Cholodkovsky, Dept. Agri. Bur. Ent., 8, No. 1, 15, fig. 8 (1909) ; Mordwilko, Dept. Agri. Bur. Ent., 8, No. 3, 44, fig. 16 (1909) ; Davis, Bull., No. 276, U.S. Dept. Agri. (1915) ; Matsumura, Journ. Coll. Agri. Tohoku Imp. Univ., VII., 361 (1917) ; Das Mem. Ind. Mus., VI., 4, 157 (1918).

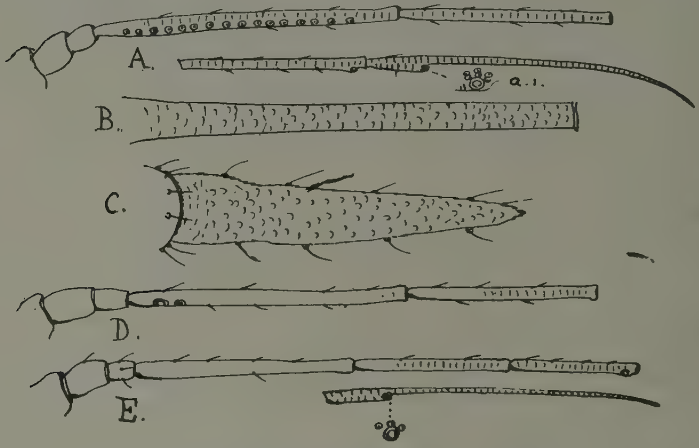

Fig. 74.—*Macrosiphum pisi* Kaltenbach.
A. B. C. Antenna, cornicle and cauda of alate female ; D. Antenna of apterous female ; E. Antenna of nymph.

Alate viviparous female. Green of various shades, some very pallid, others apple green to grass green, sometimes with a slight mealy coat of varied extent, at others shiny. Eyes deep red to black. Antennæ very long; pale yellowish-green; apices of segments dark; vi. mostly dark, or olive-green or yellowish-green; iv. not quite so long as iii.; iii. with a line of 12 to 20 sensoria not reaching to apex; iv. and v. about equal; vi. as long as iv. + v. Cauda long, ensiform. Cornicles long and thin, as long as or longer than cauda; pale green to yellow-green, apex dusky, imbricated. Legs green, apices of femora and tibiæ dusky; tarsi dark. Wings with yellowish stigma, varying to yellowish-green. In some the thoracic lobes darkened.

Length 2.5 to 3 mm.; wing expanse 9 to 9.4 mm.

Apterous viviparous female. Green, spindle shaped, elongate, smooth, often shiny, now and then glaucous. Abdomen sometimes shows six dark spots on each side. Legs green to yellow-green, darkened areas as in alatæ. Cauda long, ensiform. Antennæ very long, pale yellowish-green, marked as in alatæ; segment iv. about three-quarters length of iii.; v. not quite so long as iv.; vi. as long as iv. + v.; iii. with two sensoria near base. Cornicles pale green, apices dusky, long, thin, but not quite reaching beyond cauda, imbricate.

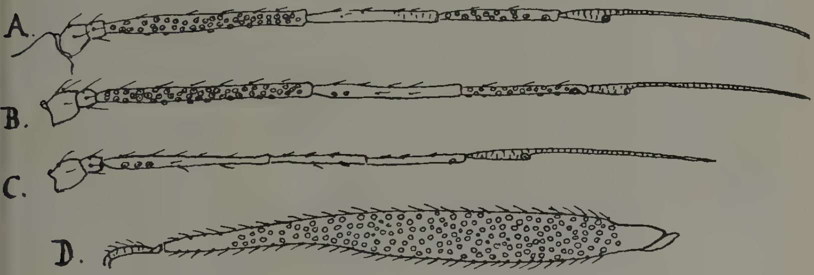

Fig. 75.—*Macrosiphum pisi* Kaltenbach.
A. Antenna of Winged male; B. of Apterous male; C. Antenna and D. Hind tibia of Oviparous female.

Length 2.2 to 3 mm.

Pupa. Similar generally to apteræ. Wing cases dusky at apices; now and then body shows darker mottlings and a dark green dorsal line; often glaucous.

Oviparous female. Apterous. Pale pea green to yellow-green; head and apex of abdomen paler. Eyes deep red. Antennæ pale green at base, remainder very pallid with apices of segments dusky; vi. blackish; longer than body. Cornicles and cauda pale greenish-yellow. Segment iii. of antennæ longer than iv., with 1 to 3 sensoria at base; vi. longest. Hind tibiæ swollen, especially on basal half, with many small sensoria over most of surface.

Length 1.9 mm. (Davis says in some, antennal segment iii. may have as many as ten sensoria in a row.)

Male. Alate. Head and prothoracic segment gamboge with a dusky to brownish longitudinal median dorsal marking, which does not extend quite to tip of head. Thoracic shield brownish with interstices concolorous with head. Abdomen pale green, with pale dusky markings and the segments posterior to the cornicles pale yellowish-green. Eyes very dark red, almost black. Antennæ noticeably longer than body; filament of vi. longer than iii.; entire antenna blackish except segments i. and ii. and small area at base of iii., which are pale dusky; sparsely covered with delicate inconspicuous hairs; segment iii. with 40 to 50 irregularly placed circular sensoria; iv. bare; v. with 10 to 15 sensoria, not including usual distal one, more or less in a row, but more thickly placed towards apex; base of vi. with usual distal ones. Beak whitish yellow, apex black; reaching beyond the first coxæ, but not to second. Wings as in viviparous female. Legs long and slender, the femur pale yellowish to yellowish green, becoming blackish on distal third; tibia pale brown, apex black; tarsus black. Cornicles as in viviparæ, pale, with a slight duskiness, apex blackish. Cauda ensiform, bearing moderately long hairs as in other forms, pale dusky to dusky in colour.

Length 1.4 mm.

Wingless male. Head dusky brown; thoracic segments and first abdominal segment pale yellowish; remainder of abdomen pale green with dusky markings as follows: One spot on each side, dorso-lateral in position, on the thoracic segments and first five or six abdominal segments; those on the first two thoracic segments very faint, the others gradually larger; those on first three abdominal segments being transverse markings rather than simple dots and the markings on the following abdominal segments dots or small circular spots. Antennæ on prominent frontal tubercles; much longer than body; sparsely hairy; filament of segment vi. longer than iii. ; i. and ii. dusky brown to blackish ; iii. black, extreme base paler ; iv. dark brownish, apex black ; v. black, except for small basal area, which is brownish ; vi. black ; iii. with 47 to 57 irregularly placed sensoria ; iv. bare ; v. with 14 to 18 sensoria in a row, not including distal one, on distal two-thirds ; base of vi. with usual sensoria. Rostrum reaching about to the second coxæ. Legs long and slender, the femora blackish except the basal third, which is pale ; tibia pale brown, except tip, which is black and the tarsi black. Cornicles as in winged male, pale at base, becoming faintly dusky towards tip ; the apex black. Cauda pale green and agreeing with that of the winged male.

Length 1.55 mm. (Davis).

FOOD PLANTS. All cultivated culinary and ornamental Peas (*Pisum spp.*) ; Wild Everlasting Pea (*Lathyrus sylvestris*) ; Red Clover (*Trifolium pratensis*) ; Wild White Clover (*T. repens*); Alsike (*T. hybridum*) ; Broad Beans (*Vicia faba*) ; Lucerne or Alfalfa. Davis records it on *Melilotus alba* ; Lentils (*Ervum sp.*) ; Crimson Clover (*T. incarnatum*) ; Vetches (*Vicia ludoviciana, gigantea, villosa,* etc.). It has also been found in Europe on *Chærophyllum sylvestre* ; *C. temulum* ; *Trifolium filiforme* ; Vetch (*Vicia cracca, V. sativa, V. sepium*). In 1918 and 1925 I also took numbers on *Genista tinctoria,* in the latter year smothering the pods. Das records it in India on the Glory Flower (*Clianthis dampieri*) ; *Althago maurarum* ; *Melilotus alba* ; *Medicago sativa* ; *M. falcata* ; *Lathyrus odoratus* ; *Peganum harmala* and *Dolichos lablab.*

LOCALITIES. Europe ; America ; Africa ; India ; Japan.

Observations and life-history. This Aphid passes its life on peas, clovers, vetches, lucerne or Alfalfa, etc. It has no true alternate host plant of a different group, such as we see in many aphids. They usually appear on peas and beans in late June and July, and go on breeding on them until August or late September, when they become winged and fly off to clovers and perennial peas. It winters on such perennial Leguminosæ as the Everlasting Peas (*Lathyrus*) and Clovers (*Trifolium*), etc., and at the same time may occur on such plants all the year round. It winters mainly in the egg stage, but apterous females may also over-winter. In summer many become alate and fly from the clovers, etc., to field and garden peas, and beans, and these may breed in such great numbers that the crop is ruined. The sexuales which occur on *Lathyrus* and *Trifolium* do not appear commonly in this country. I have found the ova low down on the haulm of Everlasting Peas, but now and then on any part of the plant. At first the ova are green and later become deep shiny black. In 1907 they hatched out on March 27th, in 1913 on February 28th. In America Davis records that it usually passes the winter on Clovers, either as ova or as viviparous females. In the latitude of La Fayette, Indiana, the species winters as viviparous females and ova. Further north it may winter exclusively as ova, while further south, in the latitude of Tennessee, the sexual forms are rare, and it usually winters as alate and apterous females. Still further south only viviparous females are known, and it is probable that where the winters are mild it may reproduce entirely viviparously. The reproduction period varies from 2 to 68 days, an average according to Davis of 22 days. The Aphid may live on an average 39 days. It is remarkable that we get both alate and apterous males in this species, which has been observed by Mordwilko in Russia and Davis in America. A single oviparous female seems capable of laying twenty-five eggs. This common Aphid is usually spoken of as the Green Pea Louse or Green Dolphin. In America it is called the Destructive Green Pea Louse. It is often very harmful to garden and field peas, and also attacks Sweet Peas. I have also found it doing much harm in recent years to Broad Beans in company with *Megoura viciæ*. Kirby and Spence first referred to it as harmful in 1810, and they record that " the produce was not much more than the seed sown, and that many farmers turned their swine into the pea fields, not thinking them worth harvesting. The damage in this case was caused solely by the Aphides and was universal throughout the kingdom, so that a supply for the navy could not be obtained." Miss Ormerod also refers to the damage done by it in her report for 1885. I saw it badly attacking field peas in Kent in 1904 and 1910, but some heavy thunder showers cleared the peas of the Dolphins. In 1922 it was also very harmful on field peas in parts of Kent ; on Romney Marsh much of the crop was ruined. I have found large colonies on Shepherds' Purse (*Capsella bursa-pastoris*), but have never known them to live any length of time, and I think they were there as on some of the other recorded host plants merely as casuals. Mr. Crawley sent me a specimen from Porlock with the following label attached: "Porlock (sea), 25 iv. 16. Host *Lasius niger*. Pale green." This apterous female was undoubtedly *pisi*, which often is attended by ants. Mordwilko places this insect in his genus *Acyrthosiphon*. Pergande's *M. trifolii* and Johnston's *M. destructor* have been shown to be only *M. pisi*. I still place Boyer's *Aphis onobrychidis* as a possible synonym. This cannot be settled until this green Aphid has been taken on its recorded host plant and I have failed to find one anything like it. If it proves to be *pisi* then its specific name must take the place of Kaltenbach's *pisi*, as it antedates it two years.

According to Das it is largely destroyed in India by the fungus *Entomophthora aphidis*.

MACROSIPHUM LOTI Theobald.

Acyrthosiphon loti Mordwilko.

Theobald, Trans. Sec. Cong. Ent., 384, pl. XIV., figs. 47-48 (1913): Mordwilko, Fn. d. l. Russe, 185, figs. 82, 83 (1914); Theobald, Entomologist, L., 78, 23 (1917); Ent. Mo. Mag., LXI., 73 (1925).

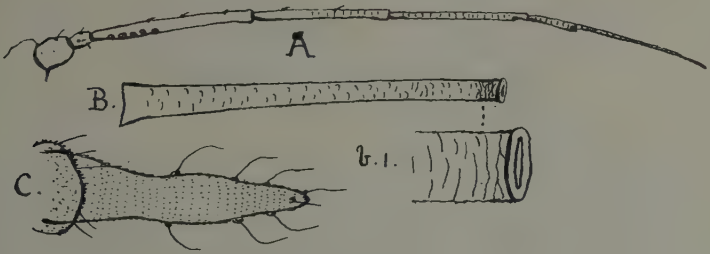

Fig. 76.—*Macrosiphum loti* Theobald.
Alate ♀; A. Antenna; B. Cornicle; b1. apex; C. Cauda.

Alate viviparous female. Green; thoracic lobes slightly darkened. Antennæ brown, except the first two segments and base of iii., as long as or longer than body; iii. with 5 or 6 sensoria in a line on basal half; iv. a little shorter than iii.; v. a little longer than iv.; vi. short, about half as long again as v. Eyes black and red. Rostrum yellow, dusky at apex, not quite reaching second coxæ. Cornicles long, pale green, imbricated.

Cauda pale green to yellowish, long with three pairs of marked lateral hairs and three or more terminal. Legs yellowish-green; apices of tibiæ and the tarsi brown; tibiæ with short hairs. Wings with pale yellowish insertions; pale brown stigma and veins.

Length 2 to 2.2 mm.

Apterous viviparous female. Similar in colour to *M. pisi*, but the cornicles are relatively much shorter and thinner; cauda shorter; segment iii. of antennæ with 1 to 3 reniform sensoria near base; relatively shorter than in *pisi*. Three marked pairs of lateral caudal setæ.

Length 2 mm.

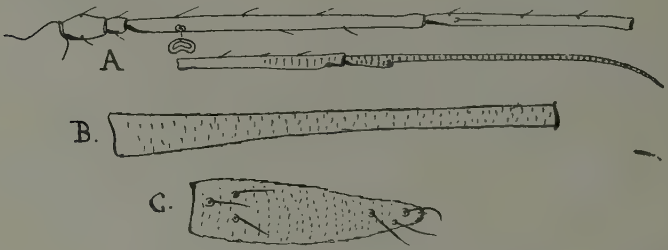

Fig. 77.—*Macrosiphum loti* Theobald.
Apterous ♀; A. Antenna; B. Cornicle; C. Cauda.

Localities. Wye, Kent; Bulverhythe, near Hastings; Little Hadham, Herts. (vi. 15); Freshwater, Isle-of-Wight (viii. 15); Bebington, Cheshire, viii. 24 (A. Dallman); Brockenhurst, New Forest (viii. 15); Great Salkeld, Cumberland (Britten); Russia (Mordwilko).

Food Plant. Bird's Foot Trefoil (*Lotus corniculatus*) and *Lotus uliginosus* (Dallman).

Observations. This seems a rare species. I found a few specimens in May near Hastings, and again in July and August at Wye; the colonies being very small. Alate females were sent me by Mr. Britten in June from Great Salkeld, and a few apteræ. One apterous female taken at Wye had abnormally long cornicles. When removed from the Bird's Foot Trefoil to peas in July the species refused to reproduce; in a day they had crawled off the peas and were wandering about. Mordwilko has found this species in Russia. Recently Mr. Dallman has sent me this species which he found swarming in *Lotus uliginosus* with many alatæ.

MACROSIPHUM DIRHODUM Walker.

Aphis dirhodum Walker.
Siphonophora dirhoda Buckton.
Macrosiphum arundinis Theobald.
Macrosiphum lycopersicæ Clarke.

Walker, Ann. Nat. Hist. Se., 2, III., 42 (1849); Buckton, Mono. Brit. Aphid., I., 132, pl. XIII. (bis.) (1875); Schouteden, Mem. Soc. Ent. Belg., XII., 238 (1906); Theobald, Journ. Eco. Biol., VIII., 128, fig. 40 (1913) and 144, 51, fig. 53 (1913) (=*arundinis*); Patch, 233, 268, fig. 92, A to C and 96 E., Maine Agri. Exp. Sta. (1914).

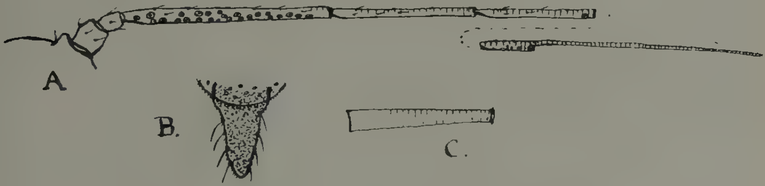

Fig. 78.—*Macrosiphum dirhodum* Walker.
Alate viviparous female. A. Antenna; B. Cauda; C. Cornicle.

Apterous viviparous female. Green to yellowish, oval; eyes deep red; apex of abdomen dusky, with two irregular darker wavy lines down the dorsum, usually deep green. Antennæ, cornicles anal plate and cauda green; legs yellowish-green; tarsi dusky. Antennæ not so long as body, often less than half (Walker says quarter, but this evidently applied to immature female); iii. longer than iv. with one to three sensoria near base; iv. and v. nearly equal; vi. not quite so long as iv. + v. Cornicles pallid green to greenish-yellow, apices dusky, a few apical striæ. Cauda pale yellowish-green, moderately long, blunt at apex, three hairs each side. Legs rather short and slender. In some the apices of antennal segments iii. to v. are dusky.

Length 2.5 to 3 mm.

Alate viviparous female. Green to yellowish-green; thorax buff with pale brown thoracic lobes. Abdomen with either a dusky green stripe or a row of dusky spots. Antennæ nearly as long as body, brown, green at base. Eyes brown. Rostrum green, apex brown. Cornicles and cauda green. Legs dull yellowish to pale green; apices of femora and tibia brown; tarsi dark. Wings with brown veins and stigma; insertions yellowish. Antennal segment i. much larger than ii.; iii. longer than iv., not so long as vi., with 23 to 32 round sensoria over whole length, mostly on one side; iv. longer than vi.; flagellum of vi. long.

Length 2 to 2.5 mm.

Male. Alate. Buff; head and thoracic lobes and venter brown. Abdomen with a black line along dorsum and a row of black spots each side. Antennæ dark, almost black, except at base where they are paler and much longer than body. Rostrum pale, apex dark. Eyes black. Cornicles pallid, apices dark. Legs pale yellowish, apices of femora and tibiæ dark; tarsi dark. Wing veins yellow; stigma brown. Cauda pale. Segment iii. of antennæ longer than iv.; iv. and v. about equal; vi. almost as long as iv. + v.; iii. with 50 to 56 sensoria; iv. with 0; v. with 10 to 15. Penis long yellow; claspers dark.

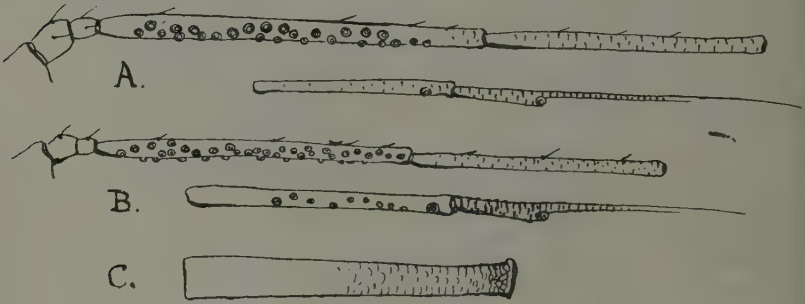

Fig. 79.—*Macrosiphum dirhodum* of Patch.
Alate ♀; Antenna A. and Cornicle C. and B. Antenna of ♂ (after Patch).

Length 1.8 to 2 mm.

Walker describes two varieties: "1. Pale orange; head, disc of thorax and that of breast black; feelers pale, orange towards the base; eyes dark red; nectaries dull brown and as long as a quarter of the body; thighs excepting the base black. 2. The nectaries yellow, with black tips."

Oviparous female. Apterous; pale lemon yellow head very pallid; eyes red; legs almost white, frequently translucent; antennæ pallid, dark at apices; cornicles pale, dusky at the tips. Dark areas at apices of femora and tibiæ; tarsi dusky. Antennæ shorter than body; segment i. larger than ii; iii. longer than iv.; iv. about as long as v.; base of vi. more than half of v.; flagellum of vi. nearly four times as long as base. Hind tibiæ flattened, with many sensoria and hairs.

Length 1 mm.

Walker described six varieties: 1, green; 2, pale straw; 3, buff; 4, light buff varied with pale red; 5, saffron; 6, orange. Buckton describes it as a delicate green.

Food Plants. Cultivated and wild Roses; Wheat, Oats, Grasses; *Polygonum persicariæ* (Buckton); Potato (D. J. Jackson).

Localities. Hollington; Ecclesbourne Glen; Rye; Coleman's Hatch; Wye; Faversham; Tenterden; Ramsgate; Canterbury; Kenley; Esher; Kingston-upon-Thames; Mitcham; Churt; Godalming; Cambridge; Great Staughton; Fowey; Truro; Falmouth; Exeter; Lynton; Budleigh Salterton; Worcester; Hereford; Chepstow; Monmouth (F.V.T.); Great Salkeld, 5 v. 12 and xi. 12 (Britten); Filey (F.V.T.); Wanstead (Buckton); Southgate, 1847 (Walker); Criccieth (F.V.T.); Chirk, 24 v. 22; Aber, 30 x. 24 (Walton); Aberystwyth, 20 iv. 25 (Jenkins); Windermere, 30 vii. 10 (Rymer Roberts); Swordale, Evanton, Ross-shire, 15 x. 22 (D. J. Jackson). Common throughout Middlesex, Bucks., Herts., Essex, from Romsey southwards, in Hants., around Midhurst, Newton Abbott, and N.E. Scotland, but in some years it is much more numerous than in others (F. Laing).

Observations. An abundant species on Roses, now and then a serious pest, but never as bad as *M. rosæ*. It probably occurs all over Great Britain and Europe, and also in America. Apteræ occur on roses from April to November. It migrates to all Graminaceæ, especially to wheat and oats. Males and sexual females occur in October on Roses. It must also winter on *Graminaceæ*, for I have found it on wheat and oats as early as April. The insect I described as *Macrosiphum arundinis* found on *Arundo phragmitus* at Wye in August, 1912, is only this species.

All the specimens I have of *M. lycopersicæ* from America seem also to be this insect.

From Miss Patch's figures and descriptions I do not feel sure that she is dealing with this species.

Macrosiphum graminum Theobald.

Journ. Eco. Biol., VIII., 52, fig. 54 (1913).

Apterous viviparous female. Uniformly pale green, semi transparent, very fragile. Eyes black. Antennæ longer than body, thin, green to pale yellow-green, last segment and apices of iii. to v. dusky ; iii. longest, about as long as iv. + v. ; iv. and v. about equal ; one sensorium base of iii. ; vi. longer than iv. + v.; iii. with a few small hairs. Rostrum green, apex dusky, reaches base of second coxæ. Cornicles pale green, semi-transparent, apex dusky, cylindrical, imbrications faint. Cauda large, semi-transparent, pale green. Tarsi dusky ; femora rather broad, with short fine hairs ; tibiæ long with many short stiff hairs, slightly darkened.

Length 1 to 1.5 mm.

Food Plants. Meadow Fox Tail and Timothy grasses.

Locality. Wye, 23 vii. 11.

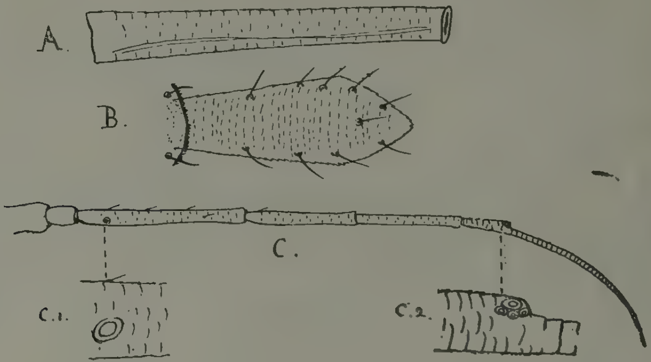

Fig. 80.—*Macrosiphum graminum* Theobald.
A. Cornicle ; B. Cauda ; and C. Antenna of apterous female ; c.1. and c.2. further enlarged sensoria.

Observations. Described from apteræ found in small colonies, with many larvæ. No alatæ appeared and the colonies died out in the Laboratory in August. It is a very fragile green insect, allied to, if not the same as, *M. dirhodum* Walker.

MACROSIPHUM THEOBALDII Davis.

Macrosiphum trifolii Theobald non Pergande.

Theobald, Journ. Eco. Biol., VIII., 139, fig. 46 (1913); Davis, Bull. No. 276, U.S. Dept. Agri. (1915).

Apterous viviparous female. Very similar in general appearance to *M. pisi* Kaltenbach, but a paler green; antennæ relatively thicker; segment iv. not nearly as long as iii.; v. as long as iv.; no sensoria on iii.

Length 2.5 mm.

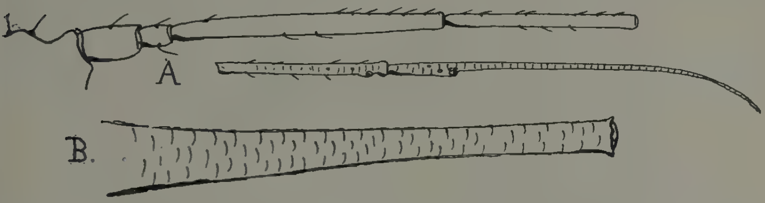

Fig. 81.—*Macrosiphum theobaldii* Davis.
A. Antenna; and B. Cornicle of apterous female.

FOOD PLANT. *Trifolium procumbens.*

LOCALITY. Wye, viii. 12 (F.V.T.).

Observations. I found this species in small numbers breeding amongst the flower heads of *Trifolium procumbens.* I was unable to obtain any alatæ. They continued to breed until mid-September, but reproduced very slowly, and then died out. As Pergande had described *M. pisi* under the name *trifolii*, Davis has renamed this insect, but expresses the opinion that it is *M. pisi*. Its general habits and appearance differ much from that species and I still retain it as distinct.

MACROSIPHUM ROGERSII Theobald.

Siphonophora fragariæ Buckton (part) (non Koch).

Theobald, Journ. Eco. Biol., VIII., 126, fig. 38 (1913); Buckton, Mono. Brit. Aphid., I., 125 (1875).

Apterous viviparous female. Bright green; eyes reddish-black; antennæ longer than body, pale green; apices of segments iii. to v. dusky; vi. dusky; iii. a little longer than iv.; iv. longer than v.; vi. not quite so long as iv. + v.; a line of 8 sensoria on iii. ending about two-thirds of its length; v. with large sub-apical sensorium; segments iii. to v. imbricated; hairs short. Frontal processes large, with small but prominent process between. Abdomen pyriform, with two rows of black spots on anterior half, irregularly disposed. Cornicles green, long, dusky at apices, cylindrical, slightly expanding basally, projecting to about level of cauda, imbricated, with 1 to 2 apical striæ. Cauda long, pale greenish-yellow, about two-thirds length of cornicles. Legs long, yellowish-green, apices of tibiæ and the tarsi dark; hairs pale and fine, short.

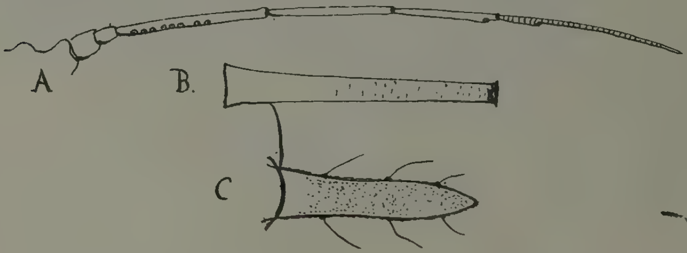

Fig. 82.—*Macrosiphum rogersii* Theobald.
A. Antenna; B. Cornicle; and C. Cauda of apterous female.

Length 2 mm.

Nymph. Pale green. Eyes reddish-black; antennæ green; segments iii. to v. with black apices; vi. all dark. Wing cases dusky. Legs greenish yellow, rather darker than body. Apices of femora and tibiæ dark; tarsi dark. Cornicles green with dark apices, slightly darker than body, which has a brighter green patch at the base of each cornicle.

Length 2 mm.

FOOD PLANT. Cultivated Strawberries.

LOCALITY. Hounslow, Middlesex.

Observations. This species which is evidently the same as Buckton took to be the apterous female of Walker's *S. fragariæ*, occurred in large numbers in May in 1912 at Hounslow. The insects were sent me by Mr. Rogers, of the Board of Agriculture, with numerous *Capitophorus fragariæ* Theobald. It differs from Walker's and Koch's species in having green cornicles, and in the green, not dark head. It is quite a distinct species and I named it after the finder. Buckton's slide of *fragariæ* shows the apterous female to have 1 to 3 sensoria on segment iii., otherwise they agree.

MACROSIPHUM TUSSILAGINIS Walker.

Aphis tussilaginis Walker.
Siphonophora tussilaginis Koch.

Walker, Ann. Nat. Hist. Se. 2, V., 380, 84 (1850) ; Koch, Die Pflanz, 158, figs. 213, 214 (1855) ; Buckton, Mono. Brit. Aphid, I., 159, pl. XXVII., fig. 3 (1875) ; Theobald, Journ. Eco. Biol., VIII., 120, fig. 35 (1913).

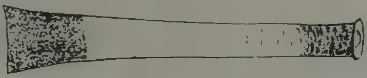

Fig. 83.—*Macrosiphum tussilaginis* Walker.
Cornicle of immature apterous female.

Apterous viviparous female. Brown to pale brown ; head dark. Antennæ yellow, as long as or a little longer than the body ; the two basal segments and vi. brown, and a narrow brown apex to the other segments, with fine short hairs ; frontal processes small. Rostrum yellow, black at apex, reaching to third coxæ. Abdomen with five small dark lateral spots with transverse rows of hairs, some arising from small dusky patches. Antennal segment iii. with 8 to 11 sensoria in a line on side of basal half. Cornicles moderately long, about quarter length of body ; yellow, black at base and apices ; cylindrical, somewhat expanded at the base, apices reticulate. Cauda pale yellowish, about half length of cornicles. Legs long, pale yellowish, a dusky spot at the femoro-tibial articulation and a dusky spot at apices of the tibiæ ; tarsi dusky ; femora and tibiæ with fine, short, yellow hairs. Eyes black and reddish black.

Length 2 to 2.5 mm.

Alate viviparous female. "Body brown; the borders and the under side of the fore-chest are pale green; abdomen pale green with a narrow row of black bands along the back and a row of black spots on each side; feelers black and a little longer than body; mouth is pale yellow, its tip and the eyes are black; nectaries are yellow with black tips and as long as quarter of the body; legs long and yellow; the hind thighs, except the base, the feet and the tips of the thighs and of the shanks black; the wings are colourless; the wing ribs and the rib-veins pale yellow; the wing bands and the other veins brown" (Walker). Segment iii. of antennæ has an irregular row of 15 to 16 sensoria on one side on basal two-thirds. Cornicles dark at base and apex, apex reticulate. Cauda pale, a little more than one-third cornicles.

FOOD PLANT. *Tussilago farfara* and *Taraxacum.*

LOCALITIES. Lancaster (Walker); Haslemere (Buckton); Guildford and Herne Bay (F.V.T.); Edinburgh, 21 x. 21, ovi. ♀ (Evans)*; Wolvercote, Oxford (Richards); Hapton, Lancs., 6. ix. 25 (Britten); Belgium (Schouteden); Germany (Koch).

Observations. This well-marked species was found by Walker in October and by Buckton in July, during which month I also found it in Kent and Surrey. The immature apteræ swarmed under the leaves at Herne Bay on the low cliffs, but no alatæ were present and when I went four weeks later there was no trace of this insect. Laing says that the specimens from Oxfordshire were making orange marks on the leaves. It is easily told by the marked cornicles, with their black base and apex, a feature I have not seen in any other Aphid. Walker describes a variety in which the abdomen is yellowish-brown; the feelers black, pale brown towards the base and nearly twice the length of the body; the nectaries are yellow with black tips, they are also black at the base, where there is a large spot of the same colour. I am not sure if Buckton's species is the same, but it is possibly a variety of it, for he describes the femora as being dark brown and being rich brown with a brassy lustre, the characteristic coloration of the cornicles in the same.

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* This will be described in the Appendix.

MACROSIPHUM SCROPULARIÆ Buckton.

Siphonophora scropulariæ Buckton.

Buckton, Mono. Brit. Aphid., I., 137, pl. xvi., figs. 1 and 2 (1875); Theobald, Journ. Eco. Biol., VIII., 116 (1913).

I have failed to find the adults of this species, so append Buckton's original description:

"*Apterous viviparous female.* Long, oval. Pale ashy, almost white, translucent, pilose. Cornicles cylindrical, straight. Antennæ long and hairy.

"*Length* 2.02 mm.

"*Pupa.* Long, oval, pointed behind. Pale yellow. Head, wing-cases and dorsum slightly clouded with grey. Eyes red. First joints of the antennæ gibbous. The whole insect is hirsute.

"*Winged viviparous female.* Bright yellow. Head very pale brown. First joints of the antennæ pale and gibbous like the pupa. Other joints brown. Ocelli conspicuous, with a brown mark on the occiput, which becomes broader on the prothorax. The lobes of the thorax and the scutellum, fine brown. Abdomen rather wrinkled, with four transverse stripes which increase in breadth as they approach the cauda. These are followed by two much broader patches above the cornicles. Cornicles very thin, yellow, straight. Legs yellow, with brown femora points, tibiæ and tarsi. Tail yellow. Wings moderately long. Insertions and cubitus pale yellow. Stigma greyish. Veins brown. This prettily marked insect was numerous towards the middle of July at Haslemere, on the Common Figwort (*Scropularia scorodonia*)."

Mr. F. Laing adds the following note: "There are no slides of this species in the Buckton Collection, and I have never come across the species."

MACROSIPHUM TANACETICOLUM Kaltenbach.

Aphis tanaceticola Kaltenbach.
Siphonophora tanaceticola Passerini.

Kaltenbach, Mono. Pflanz, 33 (1843); Buckton, Mono. Brit. Aphid., II., 159, pl. XXVII., figs. 1 and 2 (1875); Theobald, Journ. Eco. Biol., VIII., 74 (1913).

Apterous viviparous female. "Long, oval, attenuated towards thorax and head. Bright garnet red, shining. Head broad, vertex tufted. Eyes brown. Older specimens much carinated and ringed. Covered with small black tubercles and hairs. Cornicles black and slightly curved. Cauda small, and yellow. Legs reddish yellow. Tarsi black. Antennæ long yellow and like the legs, hairy.

"*Length* 1.89 mm.

"*Pupa.* Coloured much like the larva. Head brown and very broad. Wing cases yellow, like the legs."

FOOD PLANT. The Tansy (*Tanacetum vulgare*).

LOCALITY. Abingdon in May.

I have failed to find this insect. The only British record I know of is Buckton's. His description reproduced here, is from specimens taken by Walker. Kaltenbach found his specimens in September and October.

Mr. Laing adds the following: "The only slide in the Buckton Coll., 'Abingdon, May,' contains 1 pupa, and 3 immature apteræ, none of them in too good condition, and it is impossible to say much about these specimens. I have never found the species, though I have looked for it."

MACROSIPHUM AGROSTEMNIUM Theobald.

Siphonophora cichorii Buckton (part) non Koch.

Buckton, Mono. Brit Aphid., I., 163, pl. XXIX., fig. 1 (1875); Theobald, Journ. Eco. Biol., VIII., 146, 53 (1913).

Buckton described an olive green aphis with the dorsum studded with dark tubercular spots; long, thin, green cornicles and a reddish-fawn coloured alate female, with black cornicles, from the Corncockle (*Agrostemma githargo*) in June from Haslemere. He considered this to be Koch's *Siphonophora cichorii*, from *Cichorium intybum*. It certainly does not agree with Koch's species, which, as pointed out by Kaltenbach (Die Pflanz, 328) is the *serratulæ* of Linnæus. Moreover Buckton clearly describes two species under this name. The green apterous form has priority and for this I propose the name given here. Buckton's description is as follows:

Apterous viviparous female. "Long, oval. Wholly shining olive-green. Head and thorax broad. Antennæ dark green, with black at the joints. Abdomen long, carina deeply pitted. Dorsum convex and studded with dark tubercular spots. Slightly bristly. Cornicles long, thin and green. Cauda green and hairy. Legs with femora darker than the tibiæ. Eyes red. Size of body 1.89 × 0.76 mm."

MACROSIPHUM PICRIDIS Fabricius.

Aphis picridis Fabricius.
Siphonophora sisymbrii Buckton.

Fabricius, Ent. Syst., 737 (1775); Buckton, Mono. Brit. Aphid, I., 160, pl. XXVII., figs. 4 and 5 (1875).

This species will be described in full in the Appendix from specimens in Mr. Laing's possession. The apterous viviparous female is shiny metallic brown, dull greenish beneath. Cornicles black, apices reticulate. Cauda yellow, long. Antennal segment iii. with 43 to 48 sensoria.

The alate female has black head and thorax, shiny brown abdomen, dull green with blackish tinge below.

The *apterous oviparous female* has 38 to 45 sensoria on iii.; iv. and v. equal. Hind tibiæ swollen, sensoria over more than three-quarters of the length.

Mr. Laing's specimens came from Camberley; (E. Green); E. Malling (Massee); Epping Forest; Torquay and Middlewood.

FOOD PLANTS given in Host Plant list.

Genus ILLINOIA Wilson.

Metapeurum Mordwilko.
Acyrthosiphon Mordwilko.

Wilson, Ann. Ent. Soc. Am., III. 3, 318 (1910); Mordwilko, Faune d. l. Russie Hemiptera, 1, 56, 67 (1914); Faune d. l. Russie, I., 55, 62 (1914).

Two or three species found in Britain may be placed here, but the genus is so close to *Macrosiphum* that it must be retained only provisionally. It seems to me to rest entirely in the length of the cauda and its apparent form.

The characters given by Baker and they seem to me so clear, taking Wilson's type *liriodendri* Monell, are as follows: Head with prominent diverging frontal tubercles. Antennæ of six segments armed with subcircular sensoria. Fore wings with the media twice branched, hind wings with both media and cubitus present. Cornicles cylindrical sometimes slightly larger towards the middle, which appearance is accentuated by a constriction often present near distal extremity. Cauda conical, not as in Macrosiphum, with a constriction near its base. Males usually winged, oviparous females apterous.

In this genus would come *Macrosiphum dirhodum*, and another undescribed species sent me by Mr. F. Laing. *M. urticæ* comes intermediate between *Macrosiphum* and this genus, but as the relative length of the cauda varies in that species, I have left it in *Macrosiphum*. Recently *pisi* has been placed in *Illinoia*. If this is done many other species must follow. There is no reason for this.

Genus MACROSIPHONIELLA Del Guercio.

Macrosiphum Van der Goot.
Dielcysmura Mordwilko.

Del Guercio, Redia, V., 7, p. 331 (1911); Van der Goot, Tijd. v. Ent., V., 56, 145 (1913); Mordwilko, Faune Russe. Aphidodea, 56 (1914); Baker, Bull. 826, U.S. Dep. Agri. (1920).

This genus was formed by Del Guercio with Ferrari's *atrum* as the type. It is a good genus. Twelve British species occur in it.

The characters are as follows: Antennal tubercles very prominently divergent. Cornicles short and thick, with very marked reticulate ornamentation; about as long as the cauda. cauda large and to some extent constricted basally. Antennæ of six segments; sensoria prominent and circular. Wings normal. Closely allied to some of the species of *Macrosiphum*, but easily separated by the short, thick cornicles and large cauda.

The following occur in Great Britain:

Macrosiphoniella sanborni Gillette.
,, *millefolii* Fabricius.
,, *absinthii* Linnæus.
,, *artemisiæ* Boyer.
,, *lilacina* Ferrari.
,, *balsamines* Kaltenbach.

Macrosiphoniella campanulæ Kaltenbach.
,, *luteum* Buckton.
,, *asteris* Walker.
,, *limonii* Walker.
,, *tanacetaria* Kaltenbach.
,, *pulvera* Walker.

FOOD PLANTS OF *Macrosiphoniella.*

Aster tripolii	M. asteris Wlk.
Achillea millefolium	M. millefolii Fabr.
,, ,,	M. artemisiæ Boyer.
,, *ptarmica*	M. millefolii Fabr.
Artemisia absinthium	M. absinthii Linn.
,, ,,	M. artemisiæ Boyer.
,, *maritima*	M. pulvera Wlk.
,, *vulgaris*	M. absinthii Linn.
,, ,,	M. artemisiæ Boyer.
,, *abrotanum*	M. absinthii Linn.
,, ,,	M. pulvera Wlk.
,, ,,	M. artemisiæ Boyer.
Chrysanthemum sp.	M. sanborni Gill.
,, ,,	M. campanulæ Kalt.
Campanula rotundifolia	M. campanulæ Kalt.
Impatiens nolo-me-tangere	M. balsamines Kalt.
Leucanthemum vulgare	M. artemisiæ Boyer.
Orchidaceæ	M. luteum Buck.
Pyrethrum	M. millefolii Fabr.
Statice limonium	M. limonii Wlk.
Tanacetum vulgare	M. tanacetaria Kalt.
,, ,,	M. lilacina Ferr.

KEY TO BRITISH MACROSIPHONIELLA.

Alate viviparous females.

Deep red and black, abdomen deep red; cornicles black and much reticulated; cauda black; iii. with 28 to 32 sensoria; iv. with 6 to 7. *sanborni.*

Abdomen deep brown, with red tints, covered with meal, showing a dark median area. Cornicles black; iii. with 90-120 sensoria. *absinthii.*

Abdomen reddish-brown, shiny above, dull below. Cauda and cornicles black; antennæ with 50 to 60 sensoria. *campanulæ.*

Green, deeper green median line and other black markings; iii. with 29-35 sensoria. Cornicles and cauda black. *millefolii.*

Abdomen light green, somewhat mealy. Cornicles black, thick. Antennæ with base of iii. pale; with 28 to 33 sensoria. Cauda with six hairs each side and four dorso-apical ones. *artemisiæ.*

Abdomen deep green. Dark cornicles narrow, constricted at bases; apical half reticulate. Cauda 4 hairs each side; 2 dorso-apical; iii. with 18 to 30 sensoria. Small species. *pulvera.*

Base of iii. dark, secondary sensoria smaller than in *artemisiæ*, and iii. is more tuberculate. *tanacetaria.*

Yellow to pale yellow green. Cornicles black. Cauda yellow; iii. with 14 to 18 sensoria. *lutea.*

Apterous viviparous females.

Deep blackish-red to black, shiny. Cornicles black. Cauda black, longer than cornicles. Rostrum not quite to third coxæ; iii. with 18 to 20 sensoria. *sanborni.*

Dark brown, some reddish tinge, dark lateral spots, covered with white meal, a dark central spot; iii. with 50 to 70 sensoria. Cauda and cornicles black, equal in length. *absinthii.*

Rosy red to brick-dust red; head and front of thorax black; cauda and cornicles black; iii. with 8 sensoria. *lilacina.*

Reddish-brown, shiny, slender. Cauda and cornicles black, rather long; dark tubercles on body. Head and pronotum dark brown. *campanulæ.*

Shiny black to shiny metallic black. Legs white and pale yellow with dark areas. Cauda white. Cornicles black, short and thick; iii. with 9 to 10 sensoria. *balsamines.*

Green to yellow-green. Abdomen with black spots and tufts of hairs. Cornicles and cauda black. *millefolii.*

Green to deep green, somewhat mealy, head deep brown. Cornicles and cauda black, equal in length; iii. with 10 to 14 sensoria; base of iii. pale. *artemisiæ.*

Similar, but iii. with 3 to 4 sensoria. *pulvera.*

Green to deep green ; cornicles and cauda black, equal in length. Antennæ all jet black ; iii. with 14 to 18 sensoria. *tanacetaria.*

Green of various shades ; legs yellow with dark bands. Cornicles black with yellow bases. Cauda deep green to greenish-black ; iii. with 1 to 3 sensoria. *limonii.*

Olive green, shiny, abdomen with black tufts, oval, domed, venter pulverulent. Cornicles black. Cauda olive-green ; iii. with 4 to 5 sensoria and a semilunar black patch base of each cornicle. *asteris.*

Bright yellow to yellow-green with large dark brown dorsal spot. Cauda yellow. Cornicles black ; iii. with 2 to 4 sensoria. *lutea.*

MACROSIPHONIELLA SANBORNI Gillette.

Macrosiphum chrysanthemi Sanborn.
Macrosiphum chrysanthemicolens Williams.
Macrosiphum bedfordii Theobald.
Macrosiphoniella chrysanthemi Del Guercio.

Gillette, Canad. Ent., XXXX., 65 (1908) ; Sanborn, Kansas Univ. Sci. Bull. 3, 73 (1904) ; Williams, Aphid. Nebraska Neb. Univ. Studies, 10, 1910 (1911) ; Del Guercio, Redia, VII., 322, fig. 30 (1911) ; Davis, Journ. Eco. Ent., 4, No. 3, 330 (1911) ; Theobald, Bull. Ent. Res., IV., 318, fig. 4 (1914) ; Matsumura, Journ. Coll. Agric. Tohoku Imp. Univ., VII., 360 (1917) ; Das, Mem. Ind. Mus., VI., 163 (1918).

Apterous viviparous female. Deep blackish-red to almost black, shiny ; antennæ longer than body, dark, basal area of iii. pale ; i. much longer than ii., both black ; iii. longest, not quite so long as iv. + v. ; iv. shorter than iii. and about as long as v. ; vi. about as long as iv. + v. ; iii. with 18 to 20 sensoria along nearly whole length ; a single sub-apical one on v., and a group at junction of basal area and flagellum of vi. ; i. and ii. with a few long hairs ; iii. with about 10 outstanding ones on the outer side ; 3 on iv. and 2 on v. Head concave in front, with several long hairs ; frontal processes not so very marked. Rostrum not quite reaching third coxæ. Abdomen with a few long, outstanding pale hairs. Cornicles black of moderate length, much expanded basally, apical two-thirds with large reticulations, basal area imbricate; about two-thirds length of cauda. Cauda black, longer than cornicles, narrow and bluntly acuminate, with 5 hairs each side and 6 or 7 on the dorsum near apex. Anal plate dark, with 6 prominent long hairs and 2 or more less distinct. Legs pale; apical two-thirds of femora, base and apex of tibiæ and the tarsi black; moderately long; tibiæ much thinner than femora; both femora and tibiæ rather long, stiff hairs denser on tibiæ than on femora; base of femora and most of median tibiæ pale.

Length 1.5 to 1.8 mm.

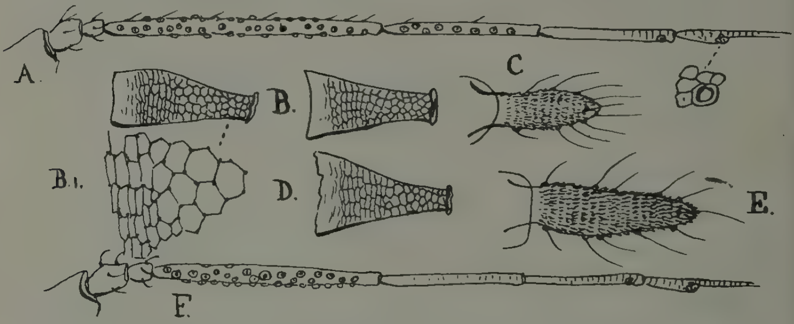

Fig. 84.—*Macrosiphoniella sanborni* Gillette.
A.-C. Antenna, Cornicle and Cauda of Alate ♀; D.-F. Cornicle, Cauda and Antenna of Apterous ♀.

Alate viviparous female. Deep red and black; abdomen deep red. Antennæ slightly longer than body, segments i. and ii. black; i. much longer than ii.; iii. long, nearly as long as vi., with 28 to 32 sensoria over the whole length, some large, and the lateral ones much projecting, giving a marked tuberculate appearance; segment iv. about as long as v., with 6 to 7 marked sensoria; vi. as long as iv. + v., basal area about one-third length of v.; flagellum long; hairs simple. Cornicles thick, black, rather short not so expanded basally as in apterous female, most of surface markedly reticulate, becoming at the base densely imbricate. Cauda black, as long as or slightly longer than the cornicles, with four pairs of long lateral hairs and two median dorsal ones. Anal plate black, spinose. Wings tinged with brown and slightly darkened along the veins. Legs with the base of the femora and most of the tibiæ pale. Proboscis with the apex black, the last two segments nearly equal.

Length 2.8 to 3 mm.

LOCALITIES. Wye, x. 14, ix.-x. 15; Swanley, x. 01; Canterbury, iii. 09; Little Hadham, Herts., 17 iii. 14; Cambridge, ix. 07; Walthamstow, ix. 07; Waltham Cross, ix. and ii. 11 and 12; Tregarth, North Wales, iii. 22 (C. L. Walton); Tenby, South Wales, viii. 90; Great Staughton, Hunts., viii. 99 (Theobald). Hendon, Torquay, Wisley, Surrey (Laing). Transvaal, 6 iv. 13; Nairobi, B.E. Africa (Theobald); Japan (Matsumura); Taihoku, Formosa (Takahashi); Punjab, India (Das); America; Buenos Aires, South America (Blanchard); Jamaica (Laing).

FOOD PLANTS. Cultivated *Chrysanthemums.*

Observations. Evidently a very widespread and common Chrysanthemum Aphid, which becomes at certain times a serious pest, both out of doors and under glass. The specimens sent me by Mr. Gerald Bedford from the Transvaal were described as a distinct species, owing to the first two antennal segments being markedly unequal and not equal as described by Del Guercio for his species and the antennæ are longer than the body. Subsequently I found this species in England to be very common, especially in Kent, and obtained alate females. Similar alatæ and apteræ sent to the Imperial Bureau of Entomology I find are the same as the British specimens, and as the relative length of the antennæ vary, I feel sure the African and European specimens are the same. Later I had sent to me from America Gillette's *Macrosiphum sanborni*, and there is no doubt that this is the same as the European and African Chrysanthemum Aphid, and thus Gillette's name has precedence.

In England this insect seems to occur from September to November in the open, and right through the winter under glass. The insects cluster in densely packed masses on the top of the shoots and often do much harm, distorting and stunting the flower buds. Das finds the early winter specimens in India larger than those from America. They may easily be controlled under glass by fumigation with tobacco shreds, and in the open by spraying with nicotine soap wash.

MACROSIPHONIELLA ABSINTHII Linnæus.

Aphis absinthii Linnæus.
Siphonophora absinthii Koch.
Aphis balsamitæ Müller.
Siphonophora artemisiæ Buckton.
Absinthifex Amyot.

Linnæus, Syst. Nat., II., 735, 19 (1767) ; Fn. Suec., 991 (1746) ; Fabricius, Ent. Syst., IV., 214, 20 (1794) ; Syst. Rhyng., 297, 20 (1803) ; Mant. Ins., II., 315, 19 (1787) ; Scopoli, Ent. Carn., 137, 401 (1763) ; Müller, Zool. Dan. Prod., 1270 (1776) ; Burmeister, Handb. Ent., II., 95, 4 (1836) ; Kaltenbach, Mono. Pflanz., 31, 19 (1843) ; Walker, Ann. Nat. Hist. Se. 2, II., 202 (1848) ; Koch, Die Pflanz, 198, 34, figs. 271, 272 (1855) ; Buckton, Mono. Brit. Aphid., I., 154, pl. XXIV., figs. 1 and 2 (1874). Theobald, Journn. Eco. Biol., VIII., 70, fig. 11 (1913).*

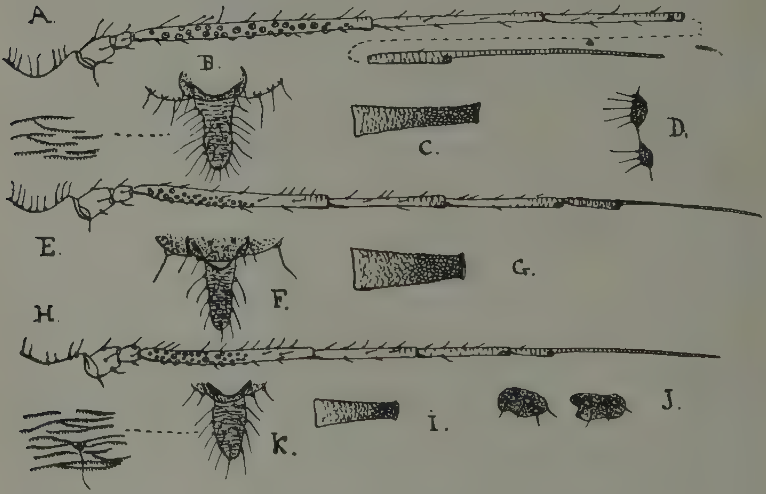

Fig. 85.—*Macrosiphoniella absinthii* Linnæus.
A. B. C. D. Alate viviparous female.
E. F. G. Apterous viviparous female.
H. K. I. J. Oviparous female.

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* Walker (Ann. Mag. Nat. Hist. II. Se. 2. 202. 1848) also gives as synonyms the following :—*Aphis tanaceti* Linnæus ; *A. artemisiæ* Fonscolombe ; *A. tanacetaria* Kaltenbach ; *A. tanaceticola* Kaltenbach ; *Tanacetifex* Amyot. None of these are correct.

Apterous viviparous female. Dark brown, some with reddish-brown hue, with dark lateral spots, pilose, more or less covered with white meal, in some a dark central spot. Antennæ deep brown, arising from marked frontal processes ; longer than body ; segment iii. longer than iv. ; iv. and v. nearly equal ; vi. short, not quite so long as iv. + v. ; iii. with 50 to 70 sensoria on basal area. Cephalic hairs yellowish, those on body rather long and arising from deep tubercles. Rostrum dark brown, reaching just beyond third coxæ. Legs deep brown ; femora very robust ; femora and tibiæ with stiff dark hairs, especially on hind tibiæ. Cauda black, as long as cornicles, which are black, thick, slightly tapering to apex ; apical half reticulate. Eyes deep red.

Length 2 to 3 mm.

Alate viviparous female. Head, thorax, legs, antennæ, cauda and cornicles black ; head and thorax with fine pruinose coating. Abdomen much as in apteræ, but markings not so distinct, that is the mealy coat is not so marked. When put in spirit the mealy matter goes and the abdomen appears dark brown, blackish brown or reddish. Base of wings yellowish. Antennæ longer than body ; segment i. larger than ii. ; iii. longer than iv. with 90 to 120 sensoria over most of its length, of two sizes ; a few hairs ; iv. longer than v. ; vi. not quite so long as iv. + v. Cornicles thick, wider but much shorter than antennal segment iii., apical half or nearly so reticulate ; slightly variable in length and form. Cauda not quite so long as cornicles and about as thick, with 5 pairs of lateral hairs and a median sub-apical one.

Length 2.5 mm.

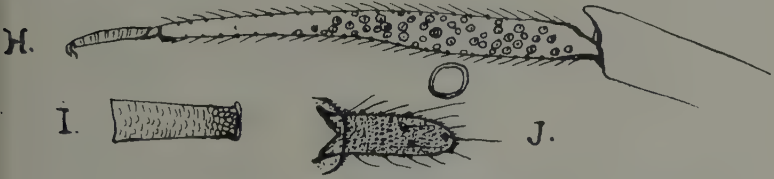

Fig. 86.—*Macrosiphoniella absinthii* L.
H. Hind tibia and tarsus ; I. Cornicle ; J. Cauda of Oviparous ♀.

Oviparous female. Similar to apterous female, but smaller. Head flattened in front, antennæ longer than body ; segment i.

larger than ii.; iii. longer than iv., not so long as v., with 35 to 50 round sensoria over two-thirds of length, none on apices; Cornicles thick, cylindrical, rather short, their apical third reticulate. Cauda as long as cornicles, with 6 hairs one side, 5 the other, one median sub-apical and two cephalad of it. Hind tibiæ long, swollen on basal half, where there are a number of narrow contoured round sensoria; hairy.

Length 1.9 to 2 mm.

LOCALITIES. Hereford, 24 vii. 11 (Durham); Tenby, South Wales, 1880; Machynlleth, North Wales, 20 viii. 13; Wye, 16 iv., 14 and 22, x. 14; New Forest, 7 viii. 14 (Theobald); Aberystwyth, Wales, viii. 16 (Walton); Wanstead (Walker). Camberley, Surrey (Green); Kew and along banks of Thames and along S. coast of Devon, where food plant occurs common (Laing). One specimen presented by Edw. Doubleday in 1848 from Scotland, but no locality mentioned.

FOOD PLANTS. *Artemisia absinthium*; *A. abrotanum*; *A. vulgaris.*

Observations. This very marked and beautiful species appears to be local in Britain. When fresh their white mealy coat is very marked and the dark areas show up plainly against it. I have for some years found this insect in great numbers at Wye on some plants of Wormwood, often literally covering them, and usually in company with *M. artemisiæ* Boyer. It occurs in greatest abundance in June and July, a few into August, and then the alatæ seem to fly away, where to I have failed to trace. In October they return in small numbers and sexuales are produced. The males and females occur low down on the plants, and eggs are laid close to the ground on the plants. This may have been because the plants every year were cut down. The apteræ and alatæ pack themselves close together on the tops of the shoots, but some wander over the foliage and are somewhat sluggish in movement, but when the Wormwood is shaken, the mature apteræ fall off, leaving the larvæ and nymphæ still firmly fixed, while on the other hand the mature apteræ of *artemisiæ* move about rapidly.

MACROSIPHONIELLA LILACINA Ferrari.

Siphonophora lilacina Ferrari.
Macrosiphum lilacina Theobald.

Ferrari, Ann. d. Mus. Civ. d. Stor. n.d. Genova, 216 (1872); Theobald, Journ. Eco. Biol., VIII., 2, 73, fig. 13 (1913).

Apterous viviparous female. Rosy red to brickdust red. Head and front of thorax black. Antennæ black, longer than body. Legs dark. Antennæ with segment iii. with 8 sensoria on basal half on one side in a line; iv. about two-thirds of iii.; v. shorter than iv. Cornicles thick with irregular hexagonal reticulation on apices. Cauda swollen slightly in the middle and moderately long, with 4 pairs of hairs on its surface, and a median apical one; 2 pairs of prominent lateral ones on basal portion, and others as shown in figure. Dark spots on abdomen.

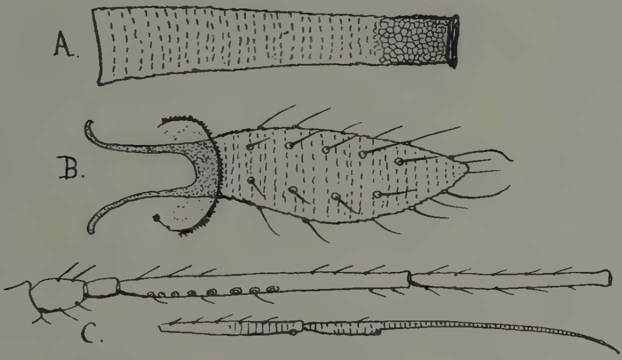

Fig. 87.—*Macrosiphoniella lilacina* Ferrari.
Apterous female. A. Cornicle; B. Cauda; C. Antenna.

Length 2.7 mm.

LOCALITY. Hereford, 24 vii. 11 (Durham).

FOOD PLANT. *Tanacetum vulgare.*

Observations. This Aphid was described by Ferrari who found it about the blossoms of *Tanacetum vulgare* on September 29th at Serravalle and Stazzano. It bears a general resemblance to other species found on the Tansy, but can at once be told by its dark almost black cornicles, with apical reticulation. I have only seen apteræ. Mr. F. Laing (Ent. Mo. Mag., LIX., 238, 1923) says Walker's *tanacetaria* (Cat. Homop. B.M. IV., 1000) may be this insect.

MACROSIPHONIELLA CAMPANULÆ Kaltenbach.

Aphis campanulæ Kaltenbach.
Siphonophora campanulæ Koch.
Macrosiphum campanulæ Theobald.

Kaltenbach, Mono. Pflanz, 26 (1843); Koch, Die Pflanz, 164, fig. 224, 225 (1855); Theobald, Journ. Eco. Biol., VIII., 81, 17, fig. 20 (1913).

Apterous viviparous female. Reddish-brown to red, shiny, slender. The red body has black spots, and black at base of cornicles and 2 black bars behind them. Cornicles long and with equally long cauda, black. Legs black, base of femora and basal half of tibiæ yellow. Antennæ shiny black, as long as body; segment iii. with sensoria on basal two-thirds. Rostrum black, middle pale, reaching to second coxæ. Eyes brown. Head dark brown, also pronotum. Anal plate black. Apex of cornicles reticulate.

Length 2 to 2.5 mm.

Alate viviparous female. Shiny black head and thorax; abdomen deep red to reddish-brown, with small black spots, a black bar before cauda, and larger black spots in front of it, shiny above, dull beneath. Antennæ, legs, rostrum, cauda, cornicles and anal plate as in apterous female, segment iii with many sensoria over it. Wings whitish, veins very thin; insertions and costa yellowish-white.

Length 2 to 2.5 mm.

Alate Male. Head, thorax, antennæ and cornicles black; abdomen reddish-brown to brown, with darker markings. Cauda black. Legs with bases of femora, most of tibiæ reddish-brown, remainder black. Antennæ longer than body; segment i. much wider and longer than ii.; iii. longer than v., with 46-55 sensoria; iv. as long or a little longer than v., with 12 to 18 sensoria; v. with 12 or more sensoria; vi. about as long or longer than iv. + v., and much longer than iii. Rostrum reaches to second coxæ; thick, dark, a pale band at junction of last two segments and one on the apical portion of the antepenultimate one. Cornicles cylindrical, expanding at the base, scarcely twice as long as the basal area of sixth ; apex reticulate, remainder imbricated. Cauda thicker than cornicles and about two-thirds their length ; spinose with 4 prominent hairs each side. Claspers normally cone-shaped and dark, with a few long hairs. Penis pale, bluntly truncate. Wings long ; venation normal.

Length 2 mm.

Oviparous female. Globose, rusty red ; cornicles, cauda, antennæ, head, anal plate, most of legs black except base of femora and basal areas of fore and mid tibiæ, which are pale to deep reddish-yellow or even red ; hind tibiæ much broadened and dark, with dense sensoria over them, except towards the apex ; tibiæ with long hairs. Antennæ longer than body ; basal segment larger than ii. ; iii. longer than iv., with 13 to 28 sensoria on its basal half to two-thirds ; iv. a little longer than v. ; i. to v. with some long hairs. Proboscis reaches to or about third coxæ, in a few past them. Cornicles as long as fifth antennal segment, thicker, cylindrical, expanded basally ; reticulate at apex, remainder imbricated. Cauda much thicker than cornicles ;

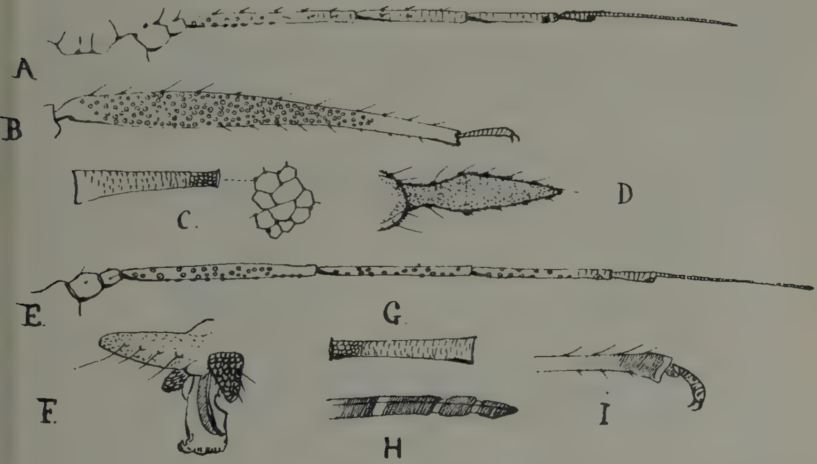

Fig. 88.—*Macrosiphum campanulæ* Kalt.

A. Head and antenna of oviparous ♀ ; B. Hind tibia ; C. Cornicle ; D. Cauda ; E. Antenna of ♂ ; F. Genitalia ; G. Cornicle ; H. Apex of Rostrum ; I. Apex of hind leg.

about half as long or rather more, spinose, with 5 long hairs each side and a sub-apical one. Eyes fairly large, with marked lateral tubercles. Head and frontal lobes prominent.

Length 2.5 to 2.7 mm.

FOOD PLANTS. *Campanula rotundifolia*; Chrysanthemums (?) (Schouteden).

LOCALITIES. Ashford Warren, Kent, 20 v. 11 (Jemmett); Windermere, 30 viii. and 20 ix. 14 (Rymer Roberts); Hothfield Common, vi.-viii. 25; Wye Downs, viii. 25 (F.V.T.).

Observations. I have only found this species twice in Britain, where it appears to be rare. The late Mr. C. Jemmett found it clustering up the flower stalks of the Harebells near Ashford, but all were immature. Mr. Rymer Roberts' specimens were all males and oviparous females. These stages are described for the first time. Buckton placed *campanulæ* as a synonym of *sonchi*. It appears to me to be distinct. Schouteden also considers it a separate species. Kaltenbach recorded it in June and July. The *larvæ* are reddish-brown with dark antennæ and cornicles; legs dark, except base of femora and rather short and thick; femora and tibiæ hairy, especially the latter. Proboscis dark, reaching to second coxæ. Antennæ as long as body; hairy; segment iii. longer than iv.; v. slightly longer than iv.; vi. a little longer than iv. + v. In very young forms segment iii. is no longer than iv. Abdomen with small hairs arising from dark tubercles. Cornicles rather thick, short, black, non-reticulate. The oviparous females laid their ova at the end of September singly on the flower stalks of the Harebells, but now and then a dozen or more close together. The alate males were sent with the females on August

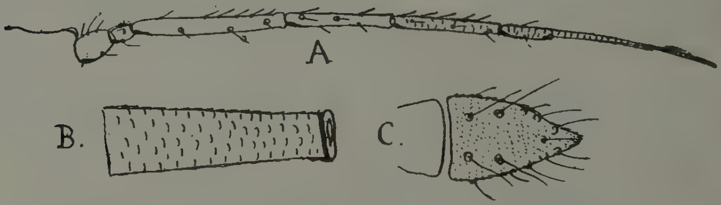

Fig. 89.—*Macrosiphoniella campanulæ* Kaltenbach.
Larva. A. Antenna; B. Cornicle; C. Cauda.

29th. In 1925, I found numbers of larvæ and apteræ on Hothfield Common in June, July and August, and a few alatæ; also on the Harebells on Wye Downs.

MACROSIPHONIELLA MILLEFOLII De Geer.

Aphis millefolii Fabricius.
Siphonophora millefolii Koch, Buckton.
Macrosiphum millefolii Theobald, etc.

De Geer, Mém. pour servir à l'histoire des Insectes, III, 60 (1773); Fabricius, Ent. Syst., IV., 214, 17 (1794); Schrank, Fn. Boica, II., 123, 1243 (1801); Latreille, Gen. Crust. et. Ins., III., 173 (1808); Koch, Die Pflanz, 182, figs. 249, 250 (1855); Walker, Ann. Mag. Nat. Hist., II., Se. 2, 199 (1848); Mosley, Gard. Chron., I., 684 (1841); Buckton, Brit. Aphid., I., 127, pl. XII. (1875); Theobald, Journ. Eco. Biol., VIII., 74, 14, figs. 14-16 (1913).

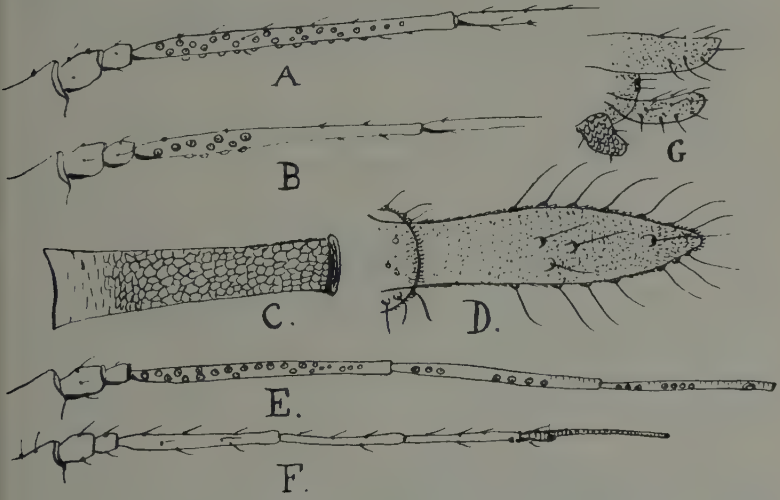

Fig. 90.—*Macrosiphoniella millefolii* De Geer.
A. Antenna of Alate ♀; B. Antenna of Apt. ♀; C. Cornicle; D. Cauda; E. Male Antenna; F. Antenna of oviparous ♀.

Alate viviparous female. Head, band on pronotum and thoracic lobes black; abdomen and front and sides of the thorax and a band between head and pronotum green; abdomen with a deeper green median line and small black transverse dots, 4 or 5 large black lateral spots and 3 or 4 smaller ones above them.

Antennæ blackish-green, darkened at apices of the segments and at the tip ; segment iii. with sensoria along nearly whole length. Eyes bright red. Cornicles black, reticulate from apex down to two-thirds of the length ; nearly straight. Legs long, dark ; femora yellowish, except at apices, tibiæ dark green, apices dusky ; tarsi dark ; hairy. Cauda long, black, with long hairs. Body with tufts of fine hairs. Wing insertions yellowish-green ; stigma yellowish-grey ; veins dark greenish.

Length 2.5 to 2.8 mm.

Apterous viviparous female. Green to greenish-yellow ; head paler than rest of body ; pronotum black ; mesothorax with black markings. Abdomen with tufts of hairs and with rows of black spots and other scattered ones. Cauda long, black, nearly as long as cornicles. Anal plate black. Antennæ black, longer than body ; segment iii. with 11 to 12 sensoria on basal half. Legs long, black ; femora of first and second pairs yellowish, with long hairs. Cornicles black, moderately reticulate over most of surface ; in some a dark crescent-shaped mark at their base.

Length 2.5 to 3 mm.

Male. Alate. Thorax, pronotum and cornicles dark brown. Abdomen deep rusty-red to almost orange, with three to four irregular dark transverse bars and some rows of spots ; three large dark spots on each side. Antennæ dark brown ; much longer than body ; segment iii. with 22 to 24 sensoria ; iv. with 7 in a line ; v. with 2 near base, 4 in middle, 2 towards apex and 3 sub-apical ; 1 at base of vi. below the usual group. Cauda dark. Penis pale, curved upwards. Cornicles black, thick, short, with large irregular hexagonal sculpturing.

Length 1.2 to 1.5 mm.

Oviparous female. Apterous. Antennæ normal ; segments iii. to v. nearly equal ; iii. somewhat swollen ; head and body hairy. Legs with long hairs, especially on the long, broad, hind tibiæ, which show sensoria for approximately two-thirds the length. Cornicles black ; short and broad, expanding basally. Cauda black, triangulate, about as long as cornicles.

Length 1.5 to 2 mm.

FOOD PLANTS. *Achillea millefolium* and *A. ptarmica* ; *Pyrethrum* sp (Schouteden).

Localities. Wye, Bearsted, Maidstone, Ramsgate, in Kent; Esher, Kingston-on-Thames, Shalford, Guildford, Kenley, in Surrey; Great Staughton and St. Neots, Hunts.; Hereford; Sidmouth, Lynton, Exeter, Teignmouth, in Devon; Worcester; Filey, Luddenden Foot in Yorks; Buxton and Millers Dale, in Derbyshire (F.V.T.); Haslemere (Buckton); Crook and Windermere (Rymer Roberts); Great Salkeld, Cumberland (Britten); Coniston, Edinburgh, 10 vii. 22 (Evans), very common in N.E. Scotland (Laing).

Observations. A very common species where it occurs, especially in autumn. The ova are laid on the seed-heads of the Yarrow and other food plants. The sexuales appear often in great numbers in October and November. The young occur in May and remain in small numbers until July, when this insect often increases at a great rate and from then onwards alate viviparous females occur. Dates on which I have noticed winged broods are July 20th, August 7th and 22nd, and in September and October continuously. The alate males with their small bodies occur side by side with the apterous oviparous females and alate viviparous females. One male appears only to fertilise a single female and then dies. They remain in copulâ a considerable time and are almost impossible to separate.

MACROSIPHONIELLA ARTEMISIÆ Boyer (non Koch).

Aphis artemisiæ Boyer.
Aphis absinthii Walker (non Linn.).

Boyer, Ann. Soc. Ent. Fr., X., 162 (1841); Ferrari, Ann. d. Mus. Civ. d. Stor. Nat. d. Genova, II., 53 and III. 212 (1872); Walker, Ann. Mag. Nat. Hist. Se. 2, II., 202 (1848); Laing, Ent. Mo. Mag. LIX., 238 (1923).

Apterous viviparous female. Green to deep green, somewhat mealy. Head and rostrum deep brown. Antennæ as long as body, black, pale at base of segment iii.; iii. longer than iv.; iv. a little longer than v.; vi. not quite so long as to a little longer than iv. + v.; with rather long pale hairs, many capitate; basal half of segment iii. with 10 to 14 sensoria; frontal lobes large with several large hairs, some of which may be capitate. Cornicles black, rather short, expanded basally, reticulate on apical half. Cauda black, nearly as long or as long as cornicles, in a few even longer, with many long lateral golden hairs. Abdomen with short scattered hairs, arising from small pale tubercles ; apical segment brown ; many hairs may be capitate. Eyes red.

Length 3 to 4 mm.

Alate viviparous females. Black ; abdomen bright green to grass green, somewhat mealy ; antennæ and legs black ; base of antennal segment iii. pale ; femora dull greenish. Head brown. Eyes reddish-brown. Rostrum reaches second coxæ or just beyond ; apex dark, base greenish-yellow. Vertex and pronotal band green, with a dark tinge. Thorax black ; scutellum green to black. Abdomen grass green, with often traces of lateral dusky spots. Cornicles black, rather thick, moderately long, slightly thickened at base, reticulate on apical half to nearly two-thirds of its length. Legs black, base of femora greenish. Wings with yellowish insertions and costa ; stigma greyish ; veins brownish. Segment i. of antennæ larger than ii. ; iii. larger than iv., with 22 to 30 round sensoria of two sizes ; iv. slightly longer than v. ; vi. with rather long basal area. Cauda with 8 hairs one side, 6 the other and a few dorso-apical ones.

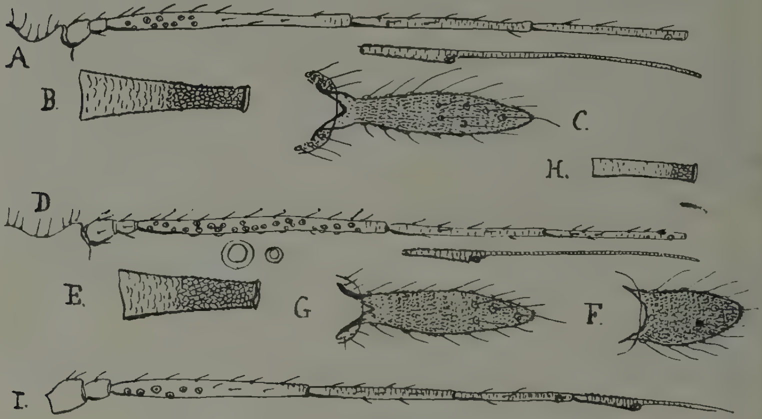

Fig. 91.—*Macrosiphum artemisiæ* Boyer.
A. Antenna ; B. Cornicle ; C. Cauda of Apterous ♀ ; D. Antenna ; E. Cornicle ; G. Cauda of Alate ♀ ; F. Cauda ; H. Cornicle ; I. Antenna of Oviparous ♀.

Length 2.4 to 2.8 mm.

Oviparous female. Apterous, of similar colour to viviparous female, but now and then showing a rusty-green hue. Antennæ longer than body; segment i. larger than ii.; iii. a little longer than iv., with 6 to 8 sensoria on basal half; iv. longer than v.; vi. with long basal area, nearly half as long as v. Cornicles black cylindrical, apices reticulate. Cauda thick, much broader than cornicles and about as long and with long hairs. Legs thick; hind tibiæ swollen on basal half and bearing on swollen area many sensoria. Rostrum reaches past third coxæ.

Length 2.5 to 3 mm.

LOCALITIES. Wye, 15 to 29 vi. 14, ix. 23, vii. and viii. 25; Sandwich, 19 viii. 22; Kew; grounds of B.M. (N.H.), S. Kensington (Laing).

FOOD PLANTS. *Artemisia vulgaris*; *A. absinthii*; *A. abrotaniella.*

Observations. I found this insect swarming on cultivated Wormwood at Wye in 1914, in company with *M. absinthii*, and usually mixed up with it, but there were a few isolated colonies only of this species. It breeds on the Wormwood all the spring and summer and into the end of October, when sexuales appear in small numbers. The first oviparous females were noticed on October 27th, and they were fairly active. The plants had been cut down and only young shoots were growing; it was upon these that I found the oviparous females, not only on the young leaves but on the dead stubs of the cut off shoots. I also found a quantity on the Old Man (*A. abrotaniella*). It has been confused with Kaltenbach's *tanacetaria*, which is a larger insect with all jet black antennæ, and which appears only to occur on the Tansy.

MACROSIPHONIELLA TANACETARIA Kaltenbach.

Aphis tanacetaria Kaltenbach.
Aphis absinthii Walker (non Linn.).
Macrosiphum artemisiæ Theobald (non Boyer).

Kaltenbach, Mono. Pflanz., 19 (1843); Walker, Ann. Mag. Nat. Hist., 2nd Se., II., 202 (1848); Theobald, Journ. Eco. Biol., VIII., 71, fig. 12 (1913); Laing, Ent. Mo. Mag., LIX., 238 (1923).

This species has been confused with Boyer's *artemisiæ*, and has usually been placed as a synonym of that species. It is quite distinct. I have only seen apteræ, so append Kaltenbach's original description of the alate female.

Apterous viviparous female. Green to deep green; head and proboscis deep brown; antennæ long, jet black, no pale basal area to segment iii.; segment iii. longer than iv., with 14-18 sensoria on basal half, scarcely visible owing to the darkness of the cuticle; iv. longer than v.; vi. not quite so long as iv. + v.; the segments with prominent hairs, many slightly capitate. Frontal lobes large with several long hairs, some of which are capitate. Cornicles black, rather short, expanded at base, apical area with marked reticulation. Cauda black, as long as the cornicles, with many long golden lateral hairs. Abdomen with short scattered hairs, arising from pale tubercles, last segment brownish; the body and legs have some slightly capitate hairs. Legs black and rather thick, femora pale just at base, with a few spine-like golden hairs; tibiæ with dense hairs. Eyes red.

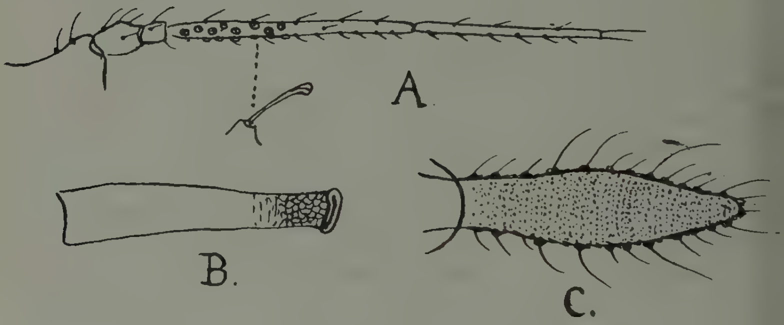

Fig. 92.—*Macrosiphum tanacetaria* Boyer.
Apterous ♀; A. Antenna; B. Cornicle; C. Cauda.

Length 4 mm.

Alate viviparous female. "Fühler schwarz Stirnknöpfe und Nebenaugen braun; Augen hellroth; Schnabel bis zum zweiten Beinpaare reichend; Lippenwulst und Schnabelspitze dunkelbraun, erstes Glied grüngelblich; Scheitel und Halsring grün mit dunkelm Anflug; Brust und Brustrücken schwarz, Schildchen grün, auch schwarz; Hinterleib hellgrün, oben mit grasgrünen Einschnitten der Segmente; Röhren lang, dunn, am Grunde kaum dicker ($\frac{3}{4}$ der Normalgrösse); Schwänzchen dick, Keulenförmig, ausgebogen, von der Länge der Röhren und, wie die schwarzen Afterläppchen, behaart; Beine schwarz, Schenkelbasis aller Beine grünlich; Flügel glashell; Geäder hellbräunlich, Unterrandader blassgelb, Randmahl graulich nach innen mit brauner Einfassung."

FOOD PLANT. Tansy (*Tanacetum vulgare*).

LOCALITIES. Great Salkeld, Penrith (Britten); Wye, 14 vi. 14; Sandwich, 7 viii. 22 (F.V.T.); Kew, Surrey (Laing); Southgate (Walker).

Observations. This species which has been confused with Boyer's *artemisiæ*, occurs as far as I know only on the Tansy. It is much larger than Boyer's species, and its very dense black antennæ easily separate it.

I have never found alatæ. Laing says: "The main difference lies in the antennæ. In *tanacetaria* the antennæ are so densely black that even after prolonged boiling in KOH it is difficult to make out the sensoria on segment iii. In *M. artemisiæ* the base of segment iii. is pale. The secondary sensoria on segment iii. of *M. tanacetaria* are smaller, slightly more numerous, and more tuberculate than in *M. artemisiæ.* The former insect is also much more robust and the over-all proportion greater than in the case of the latter insect." He does not say if this refers to the apteræ or alatæ, however.

MACROSIPHONIELLA LIMONII Walker.

Aphis limonii Walker.
Aphis sonchi var? Walker.
Macrosiphoniella staticis Theobald.

Walker, Zoologist, VI., 2248 (1848); Cat. Homop. B.M., IV., 1015 (1852); Theobald, Ent. Mo. Mag., Se. 3, IX., 23 (1923); Laing, Ent. Mo. Mag., LIX., Se. 3, IX., 238 (1923).

Apterous viviparous female. Green of various shades, some very deep green, shiny; legs yellow with dark apices to femora and tibiæ. Antennæ green with segments i. and ii. black; dark bands at apices of segments iii. to v.; vi. black. Cornicles black, with yellowish bases. Cauda deep green to greenish-black. Anal plate dark. Short, stiffly scattered hairs on body, some capitate. Antennæ about as long as body. Segment i. larger than ii.; iii. about one-third longer than v., with 1 to 3 round sensoria near base ; iv. longer than v. ; vi. shorter than iv. + v. Rostrum reaching to or nearly to third coxæ ; the apical segment much narrower than the penultimate, about the same length. Cornicles thick, cylindrical, expanding basally, about as long as antennal segment iv. ; a large reticulate apical area, remainder finely imbricate. Cauda acuminate, not quite so long as cornicles and about the same width to narrower, with 3 hairs each side and 1 median dorsal one near apex ; finely spinose. Anal plate with a few hairs, 2 prominent ones each side of cauda. All the segments of the legs from the coxa to the tarsi with stiff hairs. Abdomen with 4 pairs of small lateral processes or papillæ and a few stiff hairs.

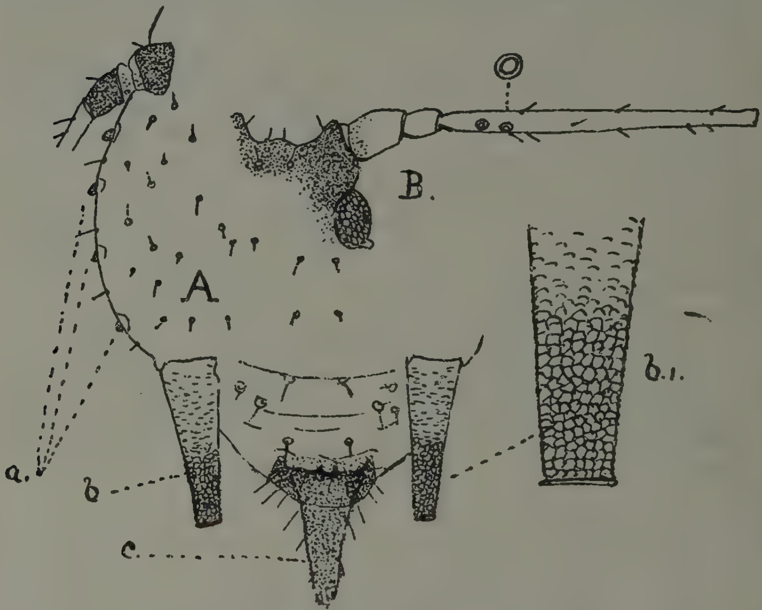

Fig. 93.—*Macrosiphoniella limonii* Walker.
A. Body of apterous ♀ ; *a.* lateral tubercles ; *b.* cornicles ; *c.* cauda ; *b.*1. enlarged apex of cornicle ; B. Head and base of antenna.

Length 3.5 to 4 mm.

Food Plant. Sea Lavender (*Statice limonium*).

Localities. Seasalter, near Whitstable, 17 viii. 22 (F.V.T.) ; Conway Estuary, viii. 25 (A. Dallman).

Observations. Re-described from a number of apteræ taken amongst the flower-heads of the Sea Lavender. It bears some resemblance to *M. asteris* Walker, but is distinct. The colour varied a good deal and a few of the specimens showed a farinose coating below, but on the dorsum all were very shiny. The yellow of the legs and the base of the cornicles was very marked in living specimens. Numbers of young larvæ occurred with the apterous females. Cleared specimens show some small dark pigmented spots on the abdomen. When I described it I imagined that Walker's insect from Sea Lavender which he named *sonchi var ?* was that species. Since then Mr. F. Laing has found Walker's type in the British Museum showing it to be the same. It is very difficult to separate in the field this insect from *M. asteris* Walker, which I have found occurring alongside with it where the Sea Lavender and Sea Aster grow together in masses.

MACROSIPHONIELLA ASTERIS Walker.

Aphis asteris Walker.

Walker, Ann. and Mag. Nat. Hist. (2), III., p. 48 (1849); Laing, Ent. Mo. Mag., V., Se. 3, p. 272, fig. 1 (1920).

Apterous viviparous female. " Olive-green, shining, under surface pulverulent, oval, domed. Antennæ equal in length to the insect itself, black, except for the proximal third of segment iii., which is pale brown. Segments i., ii. equal; iii. slightly longer than iv.; v. shorter than iv.; vi. nearly twice the length of v., the spur being four times the base; a few hairs on all the segments, imbrications faint on distal end of iii. and whole of iv., distinct on v. and vi.; proportions 5, 5, 28, 26, 20, 39 (8 + 31). Primary sensoria on v. and vi., 4 to 5 secondary sensoria on basal one-third of iii. Antennal tubercles very moderate. Head brown, eyes pink. Rostrum reaches to third pair of coxæ, greenish, dark at tip. Pro-and metathorax rather darker than the prevailing colour. Legs pale brown, with coxæ, tips of femora and of the tibiæ, tarsi and claws black. Lengths: femora of i., 0.64 mm.; iii. 0.8 mm.; tibiæ, i., 0.92 mm.; iii. 1.32 mm.; tarsi, i., 0.16 mm.; iii. 0.14 mm. *Abdomen* domed, shining, olive-green, with black tufts arranged more or less regularly in rows; these in balsam preparations generally show a spine in the middle. Semilunar black mark at base of each cornicle. Towards the margins a slightly browner shade. *Cornicles* black, wider at the base than at tip, flanged, reticulate on apical half, .3 mm. long. *Cauda* coloured as in abdomen, equal in length to the cornicles, 3-4 marginal hairs, 2-3 median-apically. *Anal plate* black. Total length 2.5 mm. Apterous females only; colour notes from living specimens.

FOOD PLANT. Sea Aster (*Aster tripolium*) (nec. *A. trifolium* of Wilson and Vicker's list)."

LOCALITIES. Shoeburyness, Essex, 31 viii. 19 (K. G. Blair); Sandwich, 19 viii. 22; Seasalter, 7 ix. 23 (F.V.T.), and 28 vi. 25 (just hatched).

Observations. This species has been redescribed by Mr. F. Laing. It had not been recorded since Walker's time. One of Walker's slides, bearing the data "asteris, [on] *A. tripolium*, Belfast, Sept. 1, 1847," is in the Hope Museum, Oxford. I have found it occurring in very small numbers on the beautiful Sea Aster on the salt lands along the Swale and the Stour near Sandwich, but could never obtain any nymphæ or alatæ. On June 27th, 1925, they were just hatching.

MACROSIPHONIELLA BALSAMINES Kaltenbach.

Aphis balsamines Kaltenbach.

Kaltenbach, Die Pflanzenfeinde d. Klasse, d. Inseckten, 84 (1874); Theobald, Ent. Mo. Mag., LXI., 71 (1925).

Apterous viviparous female. Shiny jet black to deep shiny metallic black; a few specimens have a pruinose appearance. Legs white to pallid yellow with small black areas; antennæ white or pale yellow and black; cauda white. Eyes red. Antennæ as long as or slightly longer than body; segment i. much longer than ii.; iii. longer than iv., with 9 to 10 round double contoured sensoria, unevenly disposed on one side over whole length, of varied sizes; iv. slightly longer than v., with 4 to 6 round irregularly disposed sensoria; vi. with long flagellum. Rostrum rather short and thick, reaching past second coxæ. Cornicles rather short and thick, a little longer than cauda; about half-length of antennal segment iii., expanding basally, and in some slightly so apically, reticulate just at apex, remainder imbricated, the sculpturing showing a double contour. The white cauda is broader than the cornicles, spinose, with 3 hairs each side. Anal plate spinose, pale, with a few bristles. A few scattered hairs over the head and body ; tibiæ with numerous hairs.

Length 1.9 to 2.2 mm.

FOOD PLANT. Touch-me-not (*Impatiens nolo-me-tangere*).

LOCALITY. Whitford, Flintshire (A. A. Dallman).

Observations. Found in abundance by Mr. Dallman, who sent me living specimens. The insects swarmed as a black mass on and under the top leaves and amongst the flowers. Many larvæ occurred, but only one nymph and this did not mature owing to my not being able to obtain any fresh food. I know of no record of this insect since Kaltenbach described it in 1874. The Touch-me-not is found in North Wales, and the North of England, and, according to Mr. Dallman, has been established in the former for more than fifty years.

It appears to come between the genus *Macrosiphum* and *Macrosiphoniella.*

MACROSIPHONIELLA LUTEA Buckton.

Siphonophora luteum Buckton.
Macrosiphum luteum Theobald.

Buckton, Mono. Brit. Aphid., I., 119, pl. VIII. (1875) ; Theobald, Journ. Eco. Biol., VIII., 82, 18 (1913).

Alate viviparous female. Yellow to pale yellowish-green, in some are greenish lateral spots. Antennæ dark, longer than body. Cornicles black. Legs yellow to yellowish-green, apices of femora, tibiæ and tarsi brown. Cauda yellow. Eyes red. Basal segment of antennæ larger than ii., both yellow ; iii. and following ones dark ; iii. longer than iv., not nearly so long as vi., with a row of 14 to 18 round sensoria along one side and reaching nearly to apex ; iv. longer than v. ; vi. with basal area small ; all the segments from 3 to 6 imbricated. Rostrum yellow, dusky at apex, reaching to or just past second coxæ. Cornicles thick, expanding basally, about as long as antennal segment v., apex with large reticulations. Cauda pallid, half to a little more the length of cornicles, narrow and bluntly acuminate, with a few pallid hairs . Tibiæ with fine hairs. Wings with yellow or pale green insertions; stigma greenish to greenish-brown; cubitus and other veins dark brown.

Length 1.7 to 2 mm.

Apterous viviparous female. Bright yellow to yellowish-green with a large dark brown dorsal spot. Antennæ black, except the two basal segments, longer than body; basal segment larger than ii.; iii. longer than iv., with 2 to 4 sensoria near base; iv. a little longer than v.; basal area of vi. rather long; junction of segments white; iii. to vi. imbricated; a few scanty hairs. Cornicles black, thick, expanded basally; about as long as segment vi. of antennæ; apex with large reticulations. Cauda pale yellow to pale yellowish-green, long and pointed, more than half as long as the cornicles, finely spinose, a few pallid hairs. Anal plate pale yellow. Legs long; green to yellow; most of femora dark green to brown; apex of tibiæ and tarsi brown. Eyes deep red. Rostrum yellow, dusky at apex, reaching to second coxæ.

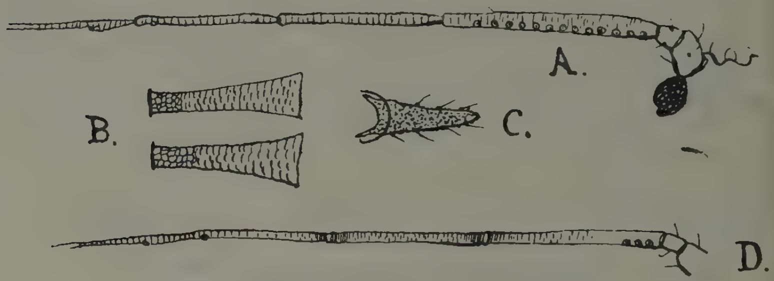

Fig. 94.—*Macrosiphoniella luteum* Buckton.
A, Antenna of alate ♀; B. Cornicles; C. Cauda; D. Antenna of apterous ♀.

Length 1.6 to 1.9 mm.

Nymph. Very similar to apterous female, but all yellow and pale yellowish-green; paler antennæ and paler cornicles. Proboscis reaches to the third pair of legs. Legs all yellow. Wing cases yellow; in a few dusky green at the tip.

Food Plants. Various *Orchidaceæ* under glass.

Localities. Carshalton, Surrey (Smee in Buckton); England (Lefroy); Brussels (Schouteden).

Observations. I have only once seen this very marked species, specimens having been sent me by Mr. Lefroy from a hot-house in England, a somewhat vague locality to give. The description of the alate female, apterous female and nymph is drawn up from this material, but it had been roughly handled. They were sent me in November, 1914. Buckton's specimens were taken in January. Schouteden found it on Cypripediums and other Orchids in the Botanical Gardens at Brussels. Laing (Ent. Mo. Mag., V., Se. 3, p. 272, 1920) considers that it should be placed in *Macrosiphum*. It seems to me to be intermediate between that genus and *Macrosiphoniella*.

MACROSIPHONIELLA PULVERA Walker.

Aphis pulvera Walker.
Aphis amica Walker.
Aphis abrotani Walker.
Aphis reducta Walker.

Zool., VI., 2218 (1848); 2218 (*amica*), (1848); List. Homop. (B.M.), IV., 1035, 299 (1852) (*abrotani*); 1044, 319 (1852) (*reducta*).

Alate female. Head and thorax dark; abdomen green with certain amount of white meal. Cauda and cornicles black; iii. with 18 to 30 sensoria of unequal size over whole length. Cauda about as long as cornicles, slightly thicker. Cornicles cylindrical, rather narrow, apical half reticulate, base imbricate.
Length 1.4 to 1.9 mm.

Apterous female. Green, with mealy bands; iii. with 3 to 4 sensoria near base. Cauda as long as or a little longer than cornicles, thicker. Cornicles as in former.
Length 1.4 to 1.9 mm.

Male. Apterous; iii. with 31 to 34 sensoria; iv. with 19 to 20; v. with 5 on apical two-thirds + primary one. Cauda and cornicles as in former.
Length 1 mm.

Oviparous female. Antennæ shorter than body; iii. with 2 to 3 small round sensoria on basal half. Cauda a little longer than cornicles, very thick. Hind tibiæ rather broadened at base, where there are 30 to 32 sensoria, some round, others oval.

FOOD PLANTS. *Artemisia maritima* and *A. abrotanum.*

Localities. Hendon, Middlesex, 16 vi. 20 and 29 vii. 25 (K. G. Blair); Seasalter, 1 vii. 25 (F.V.T.).

Observations. Walker's *pulvera* specimens are an oviparous ♀ and two ♂♂ (he described it as an apterous ♀). His slide of *amica* is of three ♂♂. His *abrotani* and *reducta* are clearly the same. It is a small species superficially resembling *artemisiæ*.

Genus MEGOURA Buckton.

Drepaniella Del Guercio.

Buckton, Mon. Brit. Aphid., I., 188 (1876); Del Guercio, Redia, IX., 188 (1913).

This genus was created by Buckton for Kaltenbach's *Aphis viciæ*. Doubt has been raised as to this being Kaltenbach's species. I see no reason to doubt it. Del Guercio set *viciæ* Kalt., as the type of *Drepaniella* and it seems to me to be the same insect and thus his genus sinks.

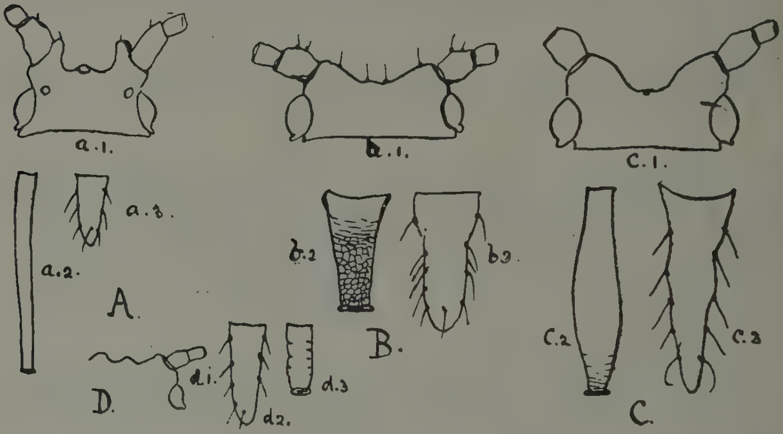

Fig. 95.
A. *Idiopterus*. B. *Macrosiphoniella*. C. *Megoura*. D. *Hyalopteroides*. a. b. c. d.1 Head; a. b. c.2 and d.3. Cornicle; a. b. c.3 and d.2 Cauda.

The general characters are: Antennal lobes distinct, as in *Macrosiphum*. Cornicles rather long, inflated in middle. Cauda nearly same length as the cornicles. Antennæ moderately long, of six segments, with circular sensoria. Venation normal. It comes very near to *Amphorophora* and may possibly have to be merged into it. Two species occur in Great Britain, *M. viciæ* Kalt., and *M. tribulis* Wlk.

MEGOURA VICIÆ Kaltenbach.

Aphis viciæ Kaltenbach.
Siphonophora viciæ Koch.
Amphorophora viciæ Schouteden.
Drepaniella viciæ Del Guercio.

Kaltenbach, Mono. Pflanz., 20 (1843); Koch, Die Pflanz, 188, figs. 259, 260 (1855); Buckton, Mono. Brit. Aphid., I., 188, pl. XXXVIII. (1875); Schouteden, Mém. Soc. Ent. Belg., XII, 242 (1892); Theobald, Trans. 2nd Ent. Congress, II., 388 (1913); Del Guercio, Redia, IX., 188 (1913).

Alate viviparous female. Head and prothorax narrower than rest of body; remainder of thorax much narrower than abdomen, which is much swollen. Head and thorax shiny black; a pale green band across the front and posterior of pronotum. Abdomen green; often so much swollen as to be as broad as long. The colour of the abdomen varies from yellow-green to bright apple green, and it has four large black spots each side, the fourth (not third as Buckton says) surrounds base of cornicles; posterior part of body marked by a semi-circular black band and the base of the cauda. Cauda jet black, as long as or even longer than cornicles. Antennæ black; longer than body; arising from very large frontal processes; segment i. nearly twice as long as ii., and wider; iii. longer than iv., with 35 to 40 sensoria; iv. a little longer than v.; vi. not quite so long as iv. + v.; hairs prominent. Cornicles jet black and slightly vasiform, about as long as the black cauda, imbricated. Eyes red. Legs long and thick, green; apical half of femora, apex of tibiæ and the tarsi black; often the legs are all black, except base of femora. Wings large, insertions pale green to pale dull yellow; cubitus and stigma green; veins dull greenish-brown and thin. Venter all green, except head and thorax which are black and a black anal patch. Cauda black with 5 pairs of lateral hairs.

Length 3 to 3.5 mm.

Apterous viviparous female. Head and pronotum shiny black; much narrower than abdomen; head often paler. Abdomen globular, bright green; in some mottled with darker green due apparently to contained embryos. Antennæ much longer than body, arising from large dark frontal lobes ; basal segment much larger than ii. ; iii. longer than iv., with 13 to 16 sensoria on basal area ; iv. slightly longer than v. ; vi. about as long as iv. + v. ; many stiff hairs. Cornicles slightly vasiform ; black ; about as long as black cauda or a little shorter. Cauda with 5 pairs of hairs ; varies in colour from jet black to deep olive green. Legs large, black to dull olive green ; apices of femora and tibiæ dark ; tarsi black. Rostrum reaching to second coxæ ; pale at base, apex with pale bands. Venter green, with some dark marks.

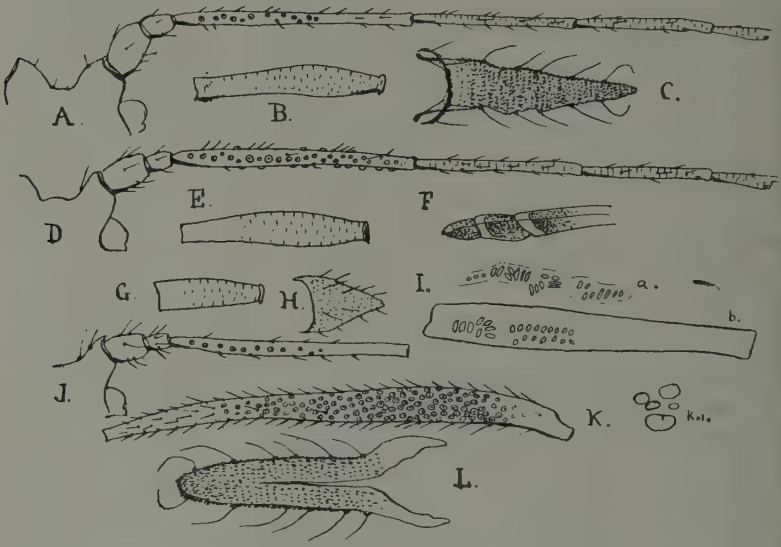

Fig. 96.—*M. viciæ* Kaltenbach.
A. Head and Antenna ; B. Cornicle ; C. Cauda of Apterous ♀; D. Head and Antenna ; E. Cornicle ; F. Rostrum of Alate ♀; G. Cornicle ; H. Cauda of Nymph ; I. Femur ; J. Head and base of Antenna ; K. Hind Tibia ; and L. Cauda of Oviparous ♀.

Length 3 to 3.5 mm.

Oviparous female. Apterous, large ; very like apterous female. Head and thorax narrower than swollen abdomen. Head and pronotum black, remainder green, except antennæ, cornicles, cauda, anal plate, coxæ, apices of femora, tibiæ and the tarsi, which are black. Antennæ longer than body, arising from large frontal lobes ; basal segment much larger than ii ; iii.

longer than iv., with 10 to 14 sensoria on basal three-fourths; iv. much longer than v.; basal area of vi. long; hairs thick. Rostrum reaches just past second coxæ. Cornicles black, imbricated, slightly vasiform; longer than cauda. Cauda black, with 6 long lateral hairs, grooved on its ventral area. Anal plate black, small, with long pale hairs. Apical segment of body black. Legs green; apices of femora and tibiæ dark; tarsi dark, hairy; hind tibiæ slightly dilated with a dense mass of sensoria on basal two-thirds. Some hairs capitate. Ova plainly visible in body.

Length 3.5 to 4 mm.

FOOD PLANTS. *Lathyrus spp.*; *Pisum spp.*; *Vicia spp.*

LOCALITIES. Keteringham, near Norwich (Buckton); Wye, Tenterden, Tunbridge Wells, Ramsgate, Swanley, Sevenoaks, Seasalter, Blean Wood, in Kent; Rudgewick, Rye, Hastings, Polegate in Sussex; Little Hadham, Herts.; Barmouth, North Wales; New Park, Midlothian, N.B. (Evans); Evanton, Ross-shire (Jackson); Edlington Wood, W. Yorks, vii. 25 (A. Dallman); Windermere (Rymer Roberts); Aberdeen, Bristol, Lewes, Birmingham (Laing); Belgium (Schouteden).

Observations. Buckton redescribed this species and placed it in the new genus *Megoura.* There is no doubt that this is Kaltenbach's *Aphis viciæ*, the *Siphonophora viciæ* of Koch. I have found it a common species in southern England on wild *Lathyrus*, and it also occurs now and again on Broad Beans and on culinary and also the ornamental Peas. On wild *Lathyrus* it occurs in May and June, and then again in the autumn, when in late September and October it may often be found in vast numbers on the seed pods. When on peas and beans I have usually found it associated with *Macrosiphum pisi* Kalt., but never in sufficient numbers to do much harm.

MEGOURA TRIBULIS Walker.

Aphis tribulis Walker.

Zool., XII., 34, App. (1849).

This dark species is dictinct from *viciæ*. The specimen is an apterous viviparous female; antennal segment iii. has 20 small sensoria along one side; the cornicles are narrower and a slightly different shape to *viciæ*. It was found on *Vicia sepium*. Type in the British Museum.

Genus AMPHOROPHORA Buckton.

Macrosiphum Oestlund.
Nectarosiphon Schouteden.
Eunectarosiphon Del Guercio.
Rhopalosiphum Van der Goot, Del Guercio.

Buckton, Mono. Brit. Aphid., I., 187 (1876); Oestlund, Minn. Geol. Survey Rept., 14, 27 (1886); Schouteden, Ann. Ent. Soc. Belg., 45, 112 (1901); Del Guercio, Redia, IX., 188 (1913); Van der Goot, Tijd. v. Ent., 56, 146 (1913); Baker, Bull. 826, U.S. Dept. Agri., 54 (1920).

The characters of the genus are as follows: Head with prominent and slightly diverging frontal tubercles. Cornicles long and swollen in or near the mid region. Cauda elongate, but much shorter than the cornicles. Antennæ moderately long, of six segments and with round sensoria. Wing venation normal.

Del Guercio's genus *Macrosiphum* included three species, *convolvuli* Kaltenbach, *viciæ* Kaltenbach, and *rubi* Kaltenbach. Later he made the last two types of other genera. This leaves only *convolvuli*, which Baker suggests is an *Amphorophora*. It is a true *Myzus*. Buckton's genus was erected for his fern species *ampullata*. Baker also places Oestlund's *Macrosiphum* here; in this I quite agree. Schouteden proposed the name *Nectarosiphum* for Oestlund's *Macrosiphum*, thus this also sinks as a synonym of *Amphorophora*. Del Guercio founded his genus *Eunectarosiphum* for Kaltenbach's *rubi*, but *rubi* is clearly an *Amphorophora*. Later Van der Goot used *ampullata* as the type of *Rhopalosiphum*. The type of the last genus is *nymphææ* Linnæus, which does not even come in the *Macrosiphoni*. In Redia, XIV., 1921, p. 135, Del Guercio regards *Aphis lactucæ* Kalt. as a typical species of the genus *Rhopalosiphum*, but *lactucæ* is clearly not congenetic with *nymphææ* and we treat it here as synonymous with *Amphorophora*.

I have placed the *Rhopalosiphum aconita* Van der Goot, here, in spite of the fact that the cauda is very nearly as long as the cornicles and thus approaches the genus *Megoura*, but the head approaches that of *Amphorophora*. It seems to be a connecting link between the two genera.

BRITISH SPECIES OF *Amphorophora*.

Amphorophora *brittenii* Theobald.
,, *rhinanthi* Schouteden.
,, *hieraceoides* sp. nov.
,, *rubi* Kaltenbach.
,, *ampullata* Buckton.
,, *laingi* Mason.
,, *evansii* Theobald.
,, *fragariella* Theobald.
,, *cosmopolitanus* Mason.
,, *loniceræ* Siebold.
,, *aconiti* V. d. Goot.
,, *triticum* Theobald.
,, *hibernaculorum* Boyer.

FOOD PLANTS OF *Amphorophora*.

Aconitum spp.	A. aconiti V. d. Goot.
Asplenium filix-mas	A. ampullata Buckt.
,, *filix femœina*	A. ampullata Buckt.
Asplenium spp.	A. laingi Mason.
Cichorium endivum	A. lactucæ Kalt.
Cystopteris montana	A. ampullata Buckt.
Daphne sp.	A. hibernaculorum Boyer.
Fragaria spp.	A. fragariella Theob.
Hieracium spp.	A. hieraceoides sp. nov.
Lactuca spp.	A. cosmopolitanus Mason.
Lapsana communis	A. loniceræ Sieb.
Lonicera xylosteum	A. loniceræ Sieb.
,, *tartarica*	A. loniceræ Sieb.
Onoclea sp.	A. laingi Mason.
Pinus austriaca	A. evansii Theob.
Polystichum sp.	A. laingi Mason.
Ribes spp.	A. cosmopolitanus Mason.
,, ,,	A. brittenii Theob.
Rhinanthus crista-galli	A. rhinanthi Schout.
,, *minor*	A. rhinanthi Schout.
Rubus fruticosus	A. rubi Kalt.
,, *idæus*	A. rubi Kalt.
Sarothamnus scoparius	A. rubi Kalt.

Sonchus arvensis	A. cosmopolitanus Mason.
,, *asper*	A. cosmopolitanus Mason.
,, *oleraceus*	A. cosmopolitanus Mason.
Triticum sp.	A. triticum Theob.

KEY TO BRITISH *Amphorophora.*

Apterous viviparous females.

A. Body ornate.

Head yellow to dull orange, black in middle. Abdomen yellow green to pale green, a large median squarish black dorsal area and other black markings. Cauda and cornicles black, former rather short and swollen in middle, apices slightly reticulate; cauda with 3 hairs each side and 2 dorso-apical; iii. with 2 sensoria. *brittenii.*

Head deep brown to chestnut-brown. Thorax and abdomen rich green; dark bars on thorax and a large dark central area and dark lateral spots and bands on abdomen. Cornicles black, much swollen in middle. Cauda deep blackish-brown; 4 pairs of lateral hairs and 1 dorso-apical; iii. with many sensoria. *rhinanthi.*

Green to yellow-green or dusky green, a row of 6 to 7 black spots each side. Cornicles pale brownish-green, apices dark, slightly clavate, slight apical reticulation. Cauda 2 hairs each side; iii. with 25 to 35 sensoria. *hieraceoides.*

Green; abdomen with 7 pairs of dark lateral spots, and 2 median pairs just before cornicles; iii. with 19-20 sensoria; 3 hairs each side of cauda. *triticum.*

B. Abdomen not ornate.

C. Cornicles long, slightly swollen.

a. Cornicles with a few apical striæ.

b. Green.

Cornicles green; iii. with 8 to 14 sensoria. Cauda 6 pairs of lateral hairs, more than half cornicles. *rubi.*

Green. Cornicles green, 1 or 2 apical striæ; iii. with 30 to 34 sensoria, nearly reaching to apex. *ampullata.*

Similar, but iii. with 7 to 20 sensoria on basal half, not in a straight line. *laingi.*

Green. Cornicles and cauda green; iii. with 1 to 2 sensoria. A few apical striæ on cornicles. Cauda 4 hairs one side, 3 the other, and 2 dorso-apical. *evansii.*

bb. Shiny green, yellowish in centre; head and thorax pale yellowish-green. *fragariella.*

aa. Cornicles reticulate at apices.

Green. Cauda large, with 5 lateral hairs one side, 4 the other; iii. with 4 sensoria. *hibernaculorum.*

CC. Cornicles moderately long and thick. A few apical reticulations or striæ.

Green to yellowish-green; cornicles and cauda green, former with a few reticulations at apices; iii. with 7 to 10 sensoria. *cosmopolitanus.*

Green to yellow-green, shiny. Cornicles yellowish to pale brownish yellow. *loniceræ.*

Rich grass green to bluish-green. Cauda and cornicles black, the latter much swollen in middle; iii. with 25 to 35 sensoria, 3 hairs each side of cauda and 2 dorso-apical ones. *aconita.*

Alate viviparous females.

A. Body ornate.

Head dark brown; thorax dark brown and yellow; abdomen pale yellowish to yellowish-green, with dark irregular transverse bars and dark lateral spots. Cauda almost black. Cornicles jet black, reticulate at apices; iii. with 40 to 43 and iv. with 12 to 20 sensoria over whole length. *brittenii.*

iii. with 60 sensoria over its length; iv. with 11 sensoria over basal two-thirds. *rhinanthi.*

Head and thorax black; abdomen green, with black lateral spots and traces of black transverse bars broken in middle. Cornicles dark, swollen, a few apical reticulations; iii. with 40 to 45 sensoria; iv. with 10 to 14; cauda with 3 pairs of lateral hairs. *hieraceoides.*

Head and thorax deep green to olive brown; abdomen bright rich green above, with an irregular median dusky line and broken dusky apical border to segments; green below, with 3 dusky lateral spots. Cornicles green, apices black; iii. with 38 to 45 sensoria. *fragariella.*

AA. Abdomen not ornate.

b. Cornicles long, slightly swollen in middle or apical half, green, a few apical striæ; thorax pale to deep reddish-brown.

Cauda green with 7 pairs lateral hairs and 2 median dorsal near apex ; iii. with 42 to 48 sensoria. *rubi.*

Green to yellowish-green ; thoracic lobes pale brownish ; iii. with 22 to 30 sensoria. Cauda with 6 pairs of long lateral hairs and 2 dorso-apical ones. *hibernaculorum.*

bb. Cornicles moderately long and thick.

c. A few apical reticulations or striæ.

d. Body ornate.

Head and thorax deep shiny black, a yellow-green pronotal band. Abdomen yellowish-green to green with an irregular dark broken area on posterior half, two pairs of smaller dark spots in front and 3 large and 1 small dark lateral spots, a large dark patch base of cornicles. Cauda pale yellow. Cornicles yellow ; iii. with 25 to 35 sensoria ; iv. with 17 to 20 ; v. with 4 to 6. *cosmopolitanus.*

Heads and thorax black ; abdomen yellowish-green with a large median dark brown patch before and between cornicles 1 or 2 irregular dark spots in front and 3 large and 2 smaller black lateral spots, a large black lateral patch behind cornicles ; iii. with 58 to 64 sensoria ; iv. with 20 to 22 and v. with 7 to 8. Cornicles brownish with paler areas. Cauda pale yellow to yellowish-brown. *loniceræ.*

dd. Body not ornate.

cc. Cornicles well reticulate at apices. Head and thorax shiny black. Abdomen rich green to bluish-green. Cornicles and cauda black ; iii. with 45 to 60 sensoria. *aconiti.*

AMPHOROPHORA BRITTENII Theobald.

Rhopalosiphum brittenii Theobald.

Theobald, Journ. Eco. Biol., VII., 3, 107, pl. II., fig. 2 (1912) ; Jackson, Scot. Nat., 85 (1918) ; Mason, Proc. U.S. Nat. Mus., 67, 14 (1925).

Alate viviparous female. Head dark brown. Pronotum dark brown, with a narrow yellow anterior band. Thorax dark brown, yellow in front and at the sides. Abdomen pale yellowish to yellowish-green with dark irregular transverse bars, the first two or 3 narrow, the next broad, then 2 small ones ; 3 large dark lateral spots, then a small one ; a large dark patch at the base of the cornicles. Cauda pointed, dusky, almost black. Cornicles jet black, large and much swollen, not reaching as far as tip of cauda; slightly reticulate at apices. Antennæ black, about same length as body; segment iii. with 40 to 43 sensoria; iv. with 12 to 20 over whole length; none on v. Legs dark brown to black; femora pale on basal half; tarsi blackish. Wings with faint yellowish-brown stigma.

Length 2.5 to 3 mm.

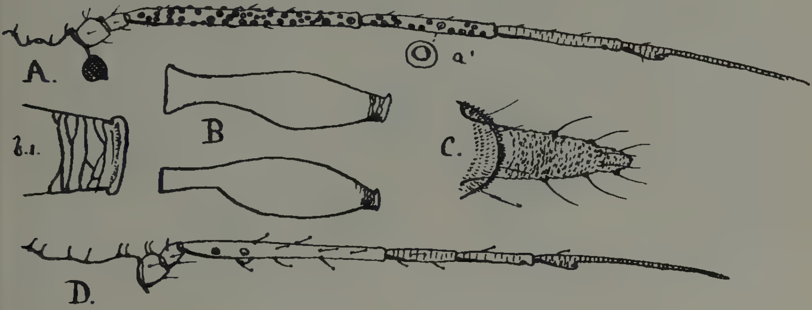

Fig. 97.—*Amphorophora brittenii* Theobald.
A. B. and C. Alate ♀; D. Apt. ♀; A. Head and antenna; B. Cornicles; b.1. enlarged apex of B; C. Cauda and anal plate; D. Head and antenna of apterous ♀

Apterous viviparous female. Head yellow to dull orange yellow, with a black median area. Antennæ black, except base of segment iii.; not so long as body; segment iii. with 2 to 5 sensoria at its base. Thorax black, with a narrow median yellowish-green transverse line. Abdomen yellowish-green to bright pale green, with a large median squarish black dorsal area, a small laterally elongate one in front and a still smaller one behind it; 4 large black lateral spots, another at the base of the cornicles and between them and the median area 6 to 8 small black specks and a pair between the two cornicles; a more or less straight and then curved black band posteriorly. Cauda black. Cornicles jet black, rather short and swollen in the middle reticulate at apices, remainder apparently unadorned. Legs jet black; femora fawn coloured at the base. Venter of body green. Eyes black.

Length 2.5 to 2.8 mm.

Nymph. Head orange-yellow. Thorax suffused pale brown. Body green with a few dark specks. Cauda black. Cornicles greenish-black. Antennæ all dark. Legs as in the apterous female but pale. Wing buds almost black.

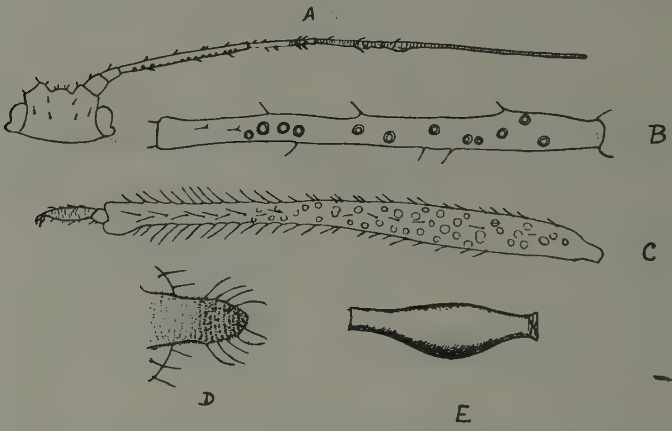

Fig. 98.—*Amphorophora brittenii* Theobald.
A. Head and Antenna; B. Enlarged segment iii.; C. Hind tibia; D. Cauda; E. Cornicle of oviparous ♀. (Miss Jackson.)

Oviparous female. "Apterous; antennæ more than three-quarters of body; posterior portion dusky; segment iii. with 10 to 20 sensoria more or less in a straight line on inner side; the antennæ often being so placed in mounted specimens that the sensoria occur exactly on the edge and therefore are less conspicuous. Segment iv. slightly longer than v. and without sensoria, its posterior half faintly imbricate; v. bears one sensorium near apex; vi. has a rhinarium with 3 to 4 small sensoria below it and is much imbricate. Cornicles dark, much swollen in the middle and narrowed at bases and towards apices, where they are narrowly reticulate. Cauda dark, equal to more than half length of cornicles, thickly covered with transverse rows of very short black spines and 4 long pale hairs one side, 5 the other. Hind tibiæ thickened for nearly three-quarters of their length and with many sensoria; apical portion narrowed, without sensoria, but with longer hairs.

Length "2.0 to 2.3 mm. (Jackson)."

FOOD PLANTS. Red and Black Currants and Gooseberries.

LOCALITIES. Great Salkeld, Cumberland (Britten); Evanton Ross-shire, N.B., and Stirkoke, Wick (Jackson).

Observations. This very marked and beautiful species was found by Mr. Britten, after whom I named it. More recently Miss Dorothy Jackson has found it in two localities in Scotland and has described the oviparous female. Apterous females and larvæ were first sent me in May 4th, and again on the 16th by Mr. Britten. The last consignment contained one nymph. In the middle of June I received alate females and a further lot on the 29th from Cumberland. Miss Jackson's specimens, taken at Evanton in August, 1917, exactly agreed with the type. In 1918 she took alate and apterous females with several oviparæ on September the 9th, at Stirkoke, Wick, where it was common on gooseberry and currants. This Aphid curls the young *Ribes* leaves, the damage being very similar to that caused by other *Ribes* feeding Plant Lice. It appears to be most prevalent on Red Currants, then on Black and then on Gooseberries in Cumberland. In Scotland Miss Jackson refers to it as common on both gooseberries and currants. It appears to be exclusively a northern species. The much ornate apterous female is very unusual.

AMPHOROPHORA RHINANTHI Schouteden.

Nectarosiphon rhinanthi Schouteden.

Schouteden, Zool. Anz., XXVI., 687 (1903); Mém. Soc. Ent. Belg., XII., 242, 1 (1906).

Apterous viviparous female. Head deep brown to chestnut brown. Thorax green to rich grass-green; pronotum dark brown; meso- and meta-notum with dark brown bars. Abdomen rich green, with a large dark central area and large dark spots on the sides of segments i. to v., and dark bands behind and some small dark spots between the central area and the large lateral spots; apex dark. Cornicles black. Cauda deep brownish-black. Anal plate dark brown. Antennæ dark brown with short hairs. Rostrum brownish-green to pale brown, apex and base dark. Legs deep greenish-brown to deep brown, base of femora green; hairy. Eyes brown. Antennæ longer than body; segment i. much larger than ii.; iii. much longer than iv. and about as long as iv. + v., with sensoria up one side to apex and scattered over it ; iv. a little longer than v. ; base of vi. small, flagellum long, longer than iv. + v. Head with a single hair on each lateral lobe and two on the raised central lobe. Rostrum reaching to third coxæ. Cornicles black, narrow at base, much swollen in middle and constricted at apices, longer than cauda and in middle much wider, not reaching the apex of the cauda. Cauda spinose, with 4 pairs of lateral hairs and an apical one. The dark anal plate has 2 hairs each side. The femora and tibiæ have numerous strong hairs and there are marked ones on the body.

Length 4 to 5 mm.

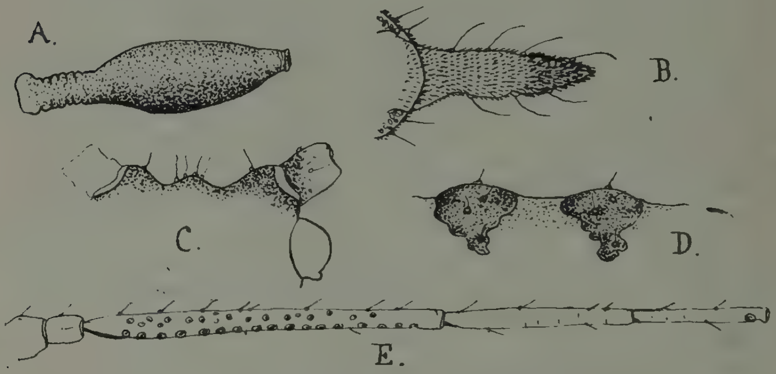

Fig. 99.—*Amphorophora rhinanthi* Schouteden.
Apterous viviparous ♀. A. Cornicle ; B. Cauda and anal plate ; C. Head ; D. Lateral abdominal hairs ; E. Antenna.

Alate viviparous female. "Kopf braun (unten heller) ; Stirn rinnenförmig, behaart, Stirnhöcker von mittelmassiger Grösse. Fühler dunkelbraun, 3 Glied am Grunde blass, sowie 1 und 2 ; 3 Glied etwas kürzer als (7), 4 = $\frac{2}{3}$ 3., 5 = 4., (6) kleiner als $\frac{1}{3}$ 4., (7) das längste. Schnabel in der Mitte blass, bis zum 3. Beinpaar reichend. Augen braun. Thorax grasgrün, die Rückenlappen und Mesosternum dunkelbraun. Hüften und Beine dunkelbraun ; Schenkelbasis grün, Füsse schwarz. Hinterleib grasgrün ; auf jedem Rückensegment eine schwarze Querbinde, jederseits mit einem kleinen Makel vereinigt ; ein grösserer Makel am Rande jedes Ringes ; die Binde zuweilen auf der Scheibe verschmolzen. Schwänzchen behaart, grasgrün, von halber Röhrenlänge ; diese dunkelbraun, stark gewölbt. Bauch grasgrün, Afterläppchen dunkelbraun. Flügel doppelt so lang als der Körper; Stigma und Geäder bräunlich." (Schouteden.)

Mr. Laing sends me an alate female, the segment iii. showing 60 sensoria over its whole length and iv. shows 11 on the basal two-thirds.

FOOD PLANTS. *Rhinanthus minor* and *Rhinanthus crista-galli.*

LOCALITIES. Crundale, near Wye, 4 viii. 22 (F.V.T.); Huntly, Aberdeenshire, N.B., viii. 21 (Laing); Catacol, Arran, ix., 1920 (J. Waterston); Blankenberg, Francordamps (Schouteden).

Observations. This very marked Aphid was described by Schouteden from *Rhinanthus minor.* Both Mr. Laing and myself have found it in Britain on *R. crista-galli.* I have only seen apterous females, so have appended the original description of the alate female. The apteræ are found in the seed capsules and those I found were accompanied by numerous green young, often very pale.

AMPHOROPHORA HIERACEOIDES sp. nov.

Alate viviparous female. Head and thoracic lobes black. Legs and cornicles dark, except base of femora and tibiæ. Antennæ dark, a little longer than body. Abdomen green, with black lateral spots and traces of black transverse bars, broken in middle. Frontal lobes rather small; segment i. of antennæ larger than ii.; iii. nearly twice as long as iv., with 40 to 45 sensoria over whole length; iv. about same length as v., with 10 to 14 sensoria along whole length; v. with 2 basal and usual sub-apical sensoria; vi. longer than iv. + v.; base of iii. and to some extent ii. paler; hairs capitate. Eyes black. Rostrum green, apex dusky, reaching to about second coxæ or just beyond. Cornicles swollen, longer than cauda with a few reticulations apically. Cauda long, dark green to pale green with 3 pairs of lateral hairs. Cornicles pale brown to pale olive-green. Wings with yellow insertions and cubitus and brown veins and stigma. Abdomen subject to considerable variation in markings, typically there are 3 large dark lateral spots in front of cornicles and others behind, and 5 or 6 dark broken transverse bars; the last between the cornicles and dusky irregular markings behind; a transverse row of blunt hairs across each segment; in others the bars are broken into spots, in some almost absent.

Length 1.8 to 2 mm.

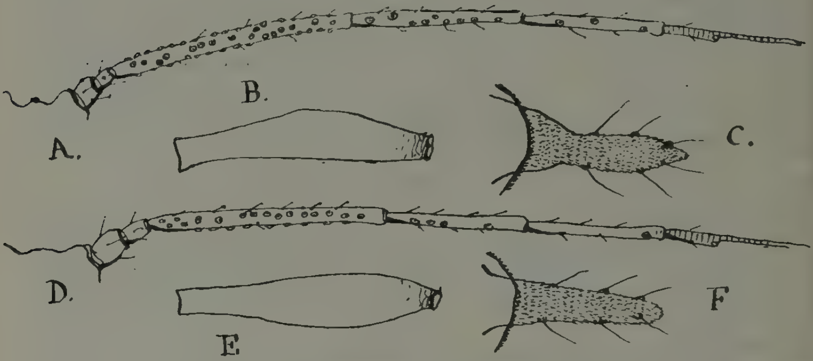

Fig. 100.—*Amphorophora hieraceoides* sp.n.
A. B. and C. Alate ♀; D. E. and F. Apterous ♀. A. Head and antenna; B. Cornicle; C. Anal plate and cauda of alate ♀; D. Head and antenna; E. Cornicle; F. Cauda of Apterous ♀

Apterous viviparous female. Green to yellowish-green or dusky-green; shiny with a row of 6 to 7 black spots on each side in a groove, one pair on thorax. Legs and cornicles pale brownish-green; apices of latter darkened; apices of tibiæ and the tarsi dark. Antennæ nearly same length as or longer than body; segments i. and ii. and basal half of iii. pale, remainder greenish-brown to brown; in others apices of segments dusky; i. wide and longer than ii.; iii. about twice as long as iv, with 25 to 35 sensoria over its whole length, or rarely on basal two-thirds; iv. and v. about equal; iv. with 0 to 4 sensoria; vi. a little longer than iv. + v.; all the segments faintly imbricated; hairs slightly capitate. Eyes black. Rostrum green, black at apex, reaching past second coxæ, often nearly to third. Cornicles slightly clavate, green to dark olive-green, dusky at apex, with slight reticulation, just at apex. Cauda green; about two-thirds length of cornicles, with 2 pairs of lateral chætæ and a dorsal sub-apical pair. Legs rather long and thin, apex of tibiæ and the tarsi dark; tibiæ hairy.

Length 1.5 to 2 mm.

Food Plant. *Hieracium sp.*

Locality. Wye, vii. and viii. 11 ; vii. to ix. 12, 13 and 25 (F.V.T.).

Observations. Found in dense masses up the flower-stalks and beneath the blossoms of a cultivated Hawkweed. Alatæ appear in July and go on until August. But by the end of September none can be found. There is considerable variation in colour and also in the relative length of the antennæ in the apteræ and also in the antennal sensoria. It occurs with *Myzus hieracii,* for which it may easily be mistaken, unless the shape of the cornicles is noticed. It seems to come nearest to *Amphorophora,* where I have placed it provisionally.

AMPHOROPHORA RUBI Kaltenbach.

Aphis rubi Kaltenbach.
Siphonophora rubi Koch, Buckton, etc.
Nectarophora rubi Oestlund.
Amphorophora rubi Schouteden.
Rhopalosiphum rubi V. d. Goot.
Eunectarosiphum rubi Del Guercio.
Acyrthosiphon rubi rubi Mordwilko.
Nectarosiphon rubi Patch.
Macrosiphum rubi Del Guercio.

Kaltenbach, Mono. Pflanz., 24 (1843) ; Walker, Ann. Nat. Hist., 2nd Se. II., 423, 50 (1848) ; Zoologist, VII., App. liv. (1849) ; List. Homop., IV., 967, 58 (1852) ; Koch, Die Pflanz, 191, figs. 263, 264 (1855) ; Buckton, Mono. Brit. Aph., I., 140, pls. XVII. and XVIII. (1875) ; Del Guercio, Nuove. R. Staz. Firenze, Se. 1, 2, 159 (1900) ; Schouteden, Ann. d. l. Soc. Ent. Belg., 45, 271 (1901) ; Theobald, Rept. Eco. Zool., 35, figs. 12 and 13 (1904) ; Schouteden, Mém. Soc. Ent. Belg., XII., 242 (1906) ; Theobald, Insect and Allied Pests Fruits, 440 (1909) ; Gillette, Journ. Eco. Ent., IV., 381 (1911) ; Theobald, Ento., 50, 79 (1917) ; Shinji, Can. Ent., 49, 52 (1917) ; V. d. Goot, Beit. Kennt. d. Holl. Blattlause, 153 (1915) ; Del Guercio, Redia, 9, 188 (1913) ; Mordwilko, Fn. d. l. Russe, 251 (1919) ; Mason, Proc. U.S. Nat. Mus., 67, 52, figs. 150-157 and 190 (1925).

Alate viviparous female. Green, of various pale shades; thoracic lobes pale reddish-brown (when first hatched almost green). Slightly hairy. Antennæ much longer than body; thin, rather dark, except base of segment iii. and i. and ii., which in some, however, are dark, arising from large frontal tubercles; segment i. much larger than ii.; iii. longer than iv., with 42 to 48 sensoria all over it; iv. a little longer than v., the latter with normal sub-apical sensorium; vi. with long, thin flagellum, about as long as iv. + v. Rostrum green; apex dusky, reaching to third coxæ. Eyes red. Cornicles longer than cauda, thin, but swollen towards middle or apical half, green in some; green tipped with black in others, a few all dusky; three striæ across apex. Cauda green, rather long and prominent; with 7 pairs of lateral hairs and 2 median dorsal ones near apex. Legs long and thin, especially hind pair; green; apices of tibiæ and tarsi dark. Wings large, with yellow insertions; stigma yellowish-grey; veins almost deep brown.

Length 3 to 3.5 mm.

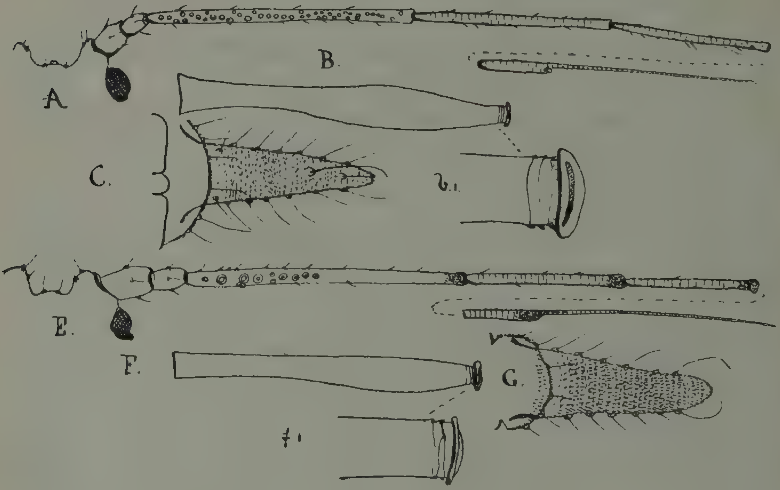

Fig. 101.—*Amphorophora rubi* Kaltenbach.

A. B. and C. Alate ♀; E. F. and G. Apt. ♀; A. Head and antenna of Alate ♀; C. Cauda; B. Cornicle, b1. enlarged apex of B; E. Head and antenna of Apterous ♀; F. Cornicle, f1. enlarged apex of F; G. Anal plate and Cauda.

Apterous viviparous female. Shiny green of various shades; slightly hairy. Eyes reddish-brown. Antennæ long and thin, as long as or longer than body; green; joints darkened, in some almost black and there is a dusky patch where the flagellum joins the basal area of segment vi.; arising from prominent frontal tubercles; segment i. is larger than ii.: iii. longer than iv., with 8 to 14 sensoria on its basal half; iv. longer than v. Cornicles long and narrow, slightly expanded at base and also in the middle or towards the apical half; in some dusky at apex and much longer than the cauda. Cauda green, long, with 6 pairs of lateral hairs, the apical pair curved at their ends. Legs long, green; tarsi dusky to black, apices of tibiæ dark, but not to the same extent as the alate female.

Length 3.2 to 3.8 mm.

Oviparous female. Apterous, green to reddish-green or pink. Antennæ much longer than body; green. Cornicles long, curved outwards, slightly swollen on the apical half, much longer than the green cauda. Legs green or pink; rather long; hind femora only slightly swollen on their apical half; hairy.

Length. 6 mm.

Male. "Green. Head very broad and black. Ocelli distinctly marked. Antennæ very long. Segment iii. of antennæ thickly strewn with sensoria along its whole length, none on iv., and 12 to 14 on apical three-quarters of v.; the proportions of the segments being 9, 5, 63, 49, 43 (10 + 75). Cornicle in same proportion, 33 (from Buckton's slide). Back, thorax and prothorax green, with black linear thoracic lobes and small scutellum. The abdomen very small, not equal to the length of the head and thorax together. Four or five transverse dark green dashes on the dorsum. Cornicles as in the winged female. Legs disproportionately long. Cauda small. Wings remarkably large. Stigma grey. From the under sides, the valves which support the penis can be easily seen. Some males are redder than the above. Occasionally the wings want the second cubital fork. Also the clavate characters of the nectaries is more marked in some specimens than in others.

"Size of body, 2.54 × 1.01; expanse of wings, 9.64 mm."

FOOD PLANTS. *Rubus idæus, Rubus fruticosus.*

LOCALITIES. Wye; Ashford; Maidstone; Tonbridge; Ramsgate; Sandwich; Ipswich; Cambridge; Topsham, Devon; Hales, Market Drayton; Kingston-on-Thames; Great Staughton, Hunts.; Fowey (Theobald); Hastings (Bloomfield); E. Malling; Wimbledon; Midhurst; New Forest; Chiltern Hills; Thames Valley; Birmingham; Aberdeen (Laing); Wanstead (Buckton); Southwater, Sussex (Gillette); Southgate, 23 viii. 47 (Walker, in Irish Nat. Mus.); Belgium (Schouteden); Germany (Kaltenbach, Koch); Webster, Massachusetts and Fort Collins, Colorado, U.S.A. (Gillette).

Observations. This species is very well defined and cannot be confused with *Macrosiphum urticæ* of Kaltenbach as Buckton suggests. Mr. Laing says, "Buckton's slide of *rubi* from broom is, it seems to me, nothing more than *pisi*. The only difference is perhaps in the antennal hairs, which are more conspicuously capitate than is usually the case with *pisi*." It occurs sometimes in great numbers on Raspberries, where it feeds on the undersides of the leaves and to some extent curls them up, but I have never known them do any appreciable damage. They may be noticed on them in May and June; but also right through the year. On the Bramble it chiefly affects the young shoots and often swarms up them as well as on the lower surface of the leaves. Alate broods are much more frequent on the Bramble than on the wild and cultivated raspberries. Some years ago (1903) I found great numbers ovipositing on raspberries. The ova, at first green, soon become black and shiny. They are laid singly and very slowly, under the rind of the canes, usually near a bud and some in the axils of the buds. Once I found quite a mass of them on Brambles. Although it lives permanently on the wild raspberry, just as it does on the Bramble, the presence on the cultivated varieties undoubtedly is due mainly to alate females coming from the Blackberry. Once I found it attacking the Loganberry and cultivated Blackberry. I have never found the alate male, so append Buckton's description. The sexuales do not appear until late October and may continue until the end of November. The red forms are merely a variety and Schouteden speaks of them as var. *rufa* Buckton. Buckton's slide is of *M. rosæ*. What part the Broom (*Sarothamnus scoparius*) plays I do not know, in its life cycle. I have never been able to find it on that bush, but Kaltenbach and Buckton give it as a food plant. Buckton says: "Later in the year, about the end of July, they are (the apteræ) common on the Broom. Often they may be seen ranged with much regularity on each side of the sutures of the green pods, all their heads being turned in one direction." Walker describes the nectaries as tipped with black. I have found this to be rarely the case with specimens on Bramble. The oviparous females sent me recently by Mr. Rymer Roberts from Windermere in late November were all pink. The *rubi* Kalt. on *Geum urbanum* in Walker's Coll. is *gei* Koch. Walker's slides both in the B.M. and Hope Mus. of *rubi* are *cyparissiæ* Buckt., i.e., *rosæ* L.? My own belief is that *rubi* is confined to *Rubus spp.* I have made many collections from broom, but never found *rubi* present.

AMPHOROPHORA AMPULLATA Buckton.

Buckton, Mono. Brit. Aphid., I., p. 187, pl. XXXVII., fig. 4 (1875).

Apterous viviparous female. Green of various shades; some almost transparent. Eyes red. Antennæ much longer than body, green, apices of segments black; segment vi. darkened. Cornicles large, apices black, dilated in middle. Cauda and anal plate yellow. Rostrum yellow, apex dark, reaching to just past second coxæ. Venter green but browner than dorsum. Legs green, apices of tibiæ dark; tarsi dark. Body and legs somewhat hairy. Frontal lobes large and gibbose. Antennal segment i. very large; ii. small; iii. long with 30 to 34 round thick-contoured sensoria reaching nearly the length of the segment; iv. shorter than iii., but longer than v., thin; v. with normal sub-apical sensorium; vi. long, basal area large. Cornicles about three-fifths of antennal segment iii. and thicker. Cauda thick, bluntly acuminate.
Length 3.3 mm.

FOOD PLANTS. *Cystopteris montana* (Buckton).

LOCALITIES. Near Lurgershall, Sussex (Buckton).

Observations. Buckton, who described this species, stated that it answers in many respects to Koch's *Rhopalosiphum staphyleæ*, which affects the Bladder Nut (*Staphylea pinnata*), but explains that the cauda is not small, nor the nectaries tipped with reddish. Buckton's specimens came from the fronds of *C. montana*, in a conservatory. His slide in the British Museum is of three apterous females. According to Mason the common Fern *Amphorophora* is a distinct species which he names *A. laingi*. This appears to me to differ only in the number of sensoria on segment iii. of the antennæ.

AMPHOROPHORA LAINGI Mason.

Rhopalosiphum ampullata Oestlund, etc.
Amphorophora ampullata Williams, etc.
Acyrthosiphon (*Amphorophora*) *ampullatus* Mordwilko.

Mason, Proc. U.S. Nat. Mus., 67, 32, figs. 112-117, 189 (1925); Oestlund, Minn. Geol. and N.H. Surv. Bull., 4, 77 (1887); Williams, Univ. Nebr. Spec. Bull., I., 19 (1891); Hunter, Iowa Agri. Exp. Sta. Bull., 60, 106 (1901); Sanborn, Kans. Univ. Sc. Bull., III., 8, 242 (1906); V. d. Goot, Beit. z. Kennt. d. Holl. Blattläuse, 142 (1915); Davis, Univ. Neb. Dep. Ent., 5, 25 (1912); Patch, Maine Agri. Exp. Sta. Bull., 202, 180 (1912); Roberts, Lancs. and Ches. Nat., X., No. 3, 78 (1917); Jackson, Scot. Nat., 158 (1919); Mordwilko, Fn. d. l. Russe, 247 (1919).

Alate viviparous female. Green; head and thorax dark; antennæ dark. Cornicles dark at apices. Antennæ longer than body; iii. with 38 to 51 sensoria, not in a row; antennal tubercles very large. Rostrum reaching beyond second coxæ. Cornicles rather long, slender, swollen; a few imbrications at apices. Cauda conical, 7 to 8 groups of lateral hairs. Legs with apices of segments and the tarsi dark. Cephalic and antennal hairs capitate (Mason).

Apterous viviparous female. Green. Antennæ longer than body, pale; iii. with 7 to 20 sensoria on basal half, more or less in a row (Mason says not in a row); antennal tubercles very large. Rostrum reaches to or past second coxæ, in some to third. Cornicles same colour as body, rather slender, swollen, apices dark, imbricated. Cauda conical, broad, with 5 to 6 groups of lateral hairs, about to less than half cornicles.

Male. Alate. Antennæ much longer than body; i. and ii. pale, rest dark; iii. very long, longer than vi., with 62 to 68 large,

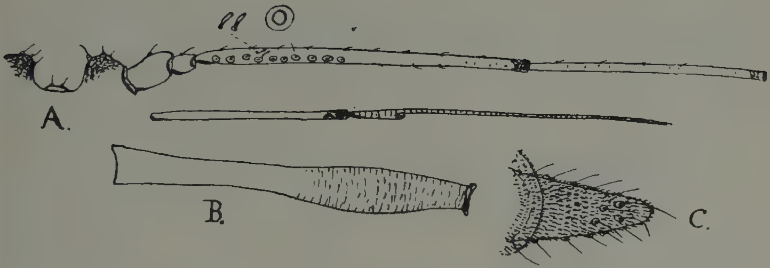

Fig. 102.—*Amphorophora laingi* Mason.
Apterous viviparous ♀. A. Head and antenna; B. Cornicle; C. Anal plate and cauda.

pale sensoria over whole length; iv. longer than v., no sensoria; v. with 14 to 18 very small ones along one side.

Oviparous female. Apterous. Antennæ longer than body; green, apices of iii. and iv. dark; v. and vi. all dark; iii. with 5 to 7 sensoria in a line near base. Hind femora long, rather narrow, many small sensoria on basal half. Legs green, a small dark area at apices of tibiæ; tarsi dark. Apices of cornicles dark. Hairs simple.

Food Plants. *Onoclea sensibilis*; *O. struthiopteris*; *Asplenium*; *Aspidium filix mas.*

Localities. Windermere, 15 ix. 15 (Roberts); Swordale, Evanton, Ross-shire, and Stirkoke, Wick, 8 ix. 21 (Jackson); Chelsea, S.W. (Dr. W. D. Lang), 7 ix. 20; 23, 28 ix. 21; Holland; Russia; Japan; United States.

Observations. Mason separates this from *ampullata* by the difference in the sensoria on segment iii. of the apteræ. The specimens from Scotland and those lent me by Mr. F. Laing, show these sensoria more or less in a line; Mason says "not in a straight row." It is probably only a variety of Buckton's species. The males, etc., are in Mr. Laing's collection.

AMPHOROPHORA EVANSII Theobald.

Ent. Mo. Mag., 3rd Se. IX., 24, fig. 2 (1923).

Apterous viviparous female. Green; apical segment of antennæ and extreme apices of cornicles dusky; apices of tibiæ and the tarsi brown. Cornicles, cauda and rostrum green, apex of latter dusky. Antennæ longer than body; segment i. much larger than ii.; iii. much longer than iv., not quite so long as vi., with 1 to 2 round sensoria near base; iv. longer than v.; latter with usual sub-apical sensorium; basal area of vi. about one-fifth of v.; flagellum long; segments i. to v. with numerous short, stiff hairs. Head with marked lateral lobes, sloping outwards to base of antennæ and with a few hairs. Rostrum reaches third coxæ. Abdomen with a few scattered hairs. Cornicles long, narrow, slightly swollen towards apices or quite cylindrical; nearly as long as antennal segment iii.; a few striæ below the flared tips. Cauda thick, acuminate, more than one-third length of cornicles, with 4 hairs one side, 3 the other and 2 sub-dorsal apical ones, its apex nearly on a level with the apices of the cornicles. Anal plate finely spinose, with a few hairs. Legs with numerous short, stiff hairs on each side and more or less paired ones down the middle. Eyes red-brown.

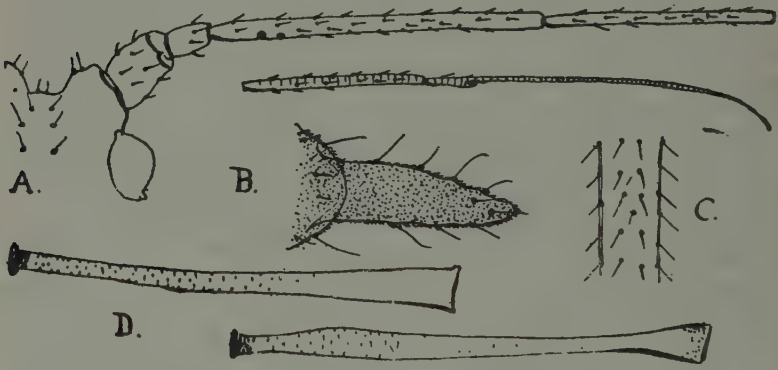

Fig. 103.—*Amphorophora evansii* Theobald.
A. Head and antenna of apterous ♀; B. Cauda and anal plate; C. Portion of leg; D. Cornicles.

Length 4 to 4.2 mm.

Food Plant. Austrian Pine.

Locality. Near Edinburgh, N.B., vii. 12 (Evans).

Observations. Described from three apteræ and many larvæ found by the late Dr. Evans, amongst needles of the Austrian Pines, with *Eulachnus agilis*. The legs are very hairy and the cornicles vary from typical *Amphorophora* type to nearly cylindrical. It comes very close to *Macrosiphum*.

AMPHOROPHORA FRAGARIELLA Theobald.

Siphonophora fragariella Theobald.
Macrosiphum fragariellum Theobald.

Theobald, Rept. Eco. Zool., 35 (1905) ; Jour. Eco. Biol., VIII., fig. 37, 124 (1913) ; Mordwilko, Fn. d. l. Russe, 263 (1919) ; Mason, Proc. U.S. Nat. Mus., Vol. 67, 53, (1925).

Alate viviparous female. Head and antennæ deep green to olive brown ; segments i. and ii. of antennæ deep brown ; base of iii. pale grey ; longer than body, arising from well marked frontal processes ; iii. with 38 to 45 sensoria, extending nearly to apex ; iv. slightly shorter than iii. and longer than v. ; vi. nearly as long as iv. + v. ; hairs on the segments numerous ; those on iii. often slightly capitate. Eyes deep brown. Pronotum olive green, a pale green band before and behind ; thoracic lobes blackish ; remainder of thorax deep green. Abdomen bright rich green above, with an irregular median dusky line and broken dusky apical borders to the segments ; green below and with three dusky lateral spots before cornicles. Rostrum green, apex shiny black, reaching past second coxæ. Cornicles jet black at apices, long and somewhat swollen on apical half ; 2 striæ at apices, 1 furcate. Legs fawn coloured ; femora and tibiæ black apically ; tarsi black. Stigma grey.

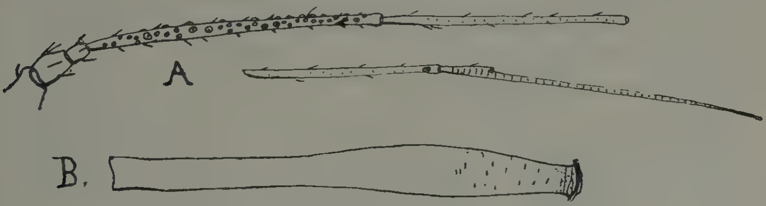

Fig. 104.—*Amphorophora fragariella* Theobald.
A. Antenna, and B. Cornicle of alate female.

Length 1.8 to 2.5 mm.

Apterous viviparous female. Body, bright shiny green, somewhat yellowish towards centre. Head and thoracic segments pale yellowish-green. Eyes black. Cornicles long, thin, green, apices black, somewhat swollen towards apices. Antennæ very long, pale tawny, with dark tips to the segments. Legs fawn coloured, uniform, except apices of tibiæ and the tarsi, which are darkened. Rostrum yellow, apex dusky.

Length 1.5 to 2 mm.

Nymph. Pure green, except for dark apices to the tibiæ and black tarsi. Antennæ green with small black apices to basal segments, forming 3 black spots and the apical half dusky. Cornicles green with black apices. Eyes black. Wing-buds green.

Length 1.5 to 2 mm.

FOOD PLANT. Cultivated Strawberries.

LOCALITIES. Ledbury, Hereford; Hounslow; Woodnesborough, near Dover.

Observations. This aphid which was sent me in 1904 appeared in great numbers at Ledbury and did considerable damage to the strawberries and has appeared in swarms there on later occasions. It seems to live entirely on the Strawberry. In February I found ova on the plants sent me and also on those I had under observation in Kent. The eggs are shiny black and are placed on the under sides of the leaves, as a rule near a vein, but some almost at the edges of the foliage. Most were laid on old leaves, but not all. Some were found on quite young leaves which showed that sexuales must have occurred very late. The ova hatched in March and continued to do so until the first week in April. The young are very sluggish, dark green lice and show scarcely any trace of frontal tubercles and the cornicles are quite cylindrical. It can at once be told from any of the other strawberry species by the shape of the cornicles in the mature forms. It apparently comes in this genus, but approaches also very closely to *Myzus*.

Mason following Mordwilko considers this the same as *rubi*. It is retained here as a separate species. *A. rubi* is confined to *Rubus spp.*

AMPHOROPHORA HIBERNACULORUM Boyer.

Aphis hibernaculorum Boyer.
Macrosiphum hibernaculorum Theobald.

Boyer de Fonscolombe, Ann. Soc. Ent. France, X., 181 (1841); Theobald, Entomologist, XLIX., 145 (1916).

Alate viviparous female. Green to yellowish-green; thoracic lobes pale brownish; antennæ longer than body; segments i. and ii. yellowish-green; iii. dark brown, except at base; iv. and v. pale yellowish-brown, apices dark; vi. brown. Eyes large, dark. Rostrum yellowish-green, apex dusky. Legs yellowish-green; apices of femora and tibiæ dark brown; tarsi dark. Cornicles long, cylindrical, moderately thick, yellowish-green basally, pale brown on apical half, apices often very dark. Cauda pale yellowish-green. Segment i. of antennæ longer and wider than ii.; iii. longer than iv., with 22 to 30 sensoria, in some extending nearly to apex, in others only for three-quarters the length, densest basally and mostly on one side; iv. about as long as v.; vi. with long flagellum. Rostrum reaching to or about second coxæ; apical segment bluntly acuminate, narrower and very slightly longer than penultimate. Cornicles long, cylindrical, slightly swelling on apical half and constricted at the apex, which is markedly reticulate, remainder imbricate. Cauda large, about ½ to rather more the length of cornicles, bluntly acuminate,

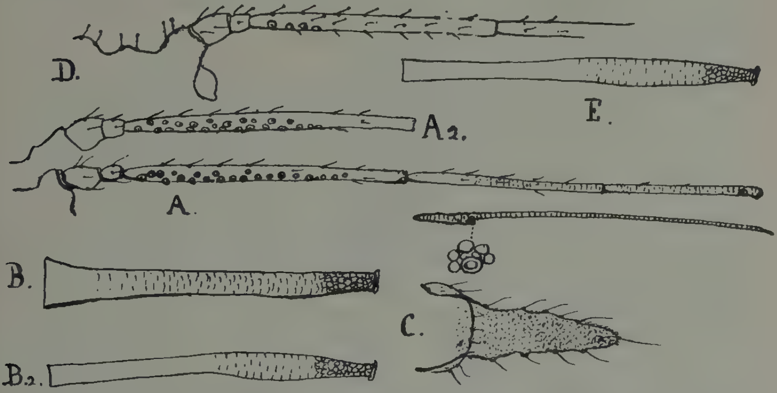

Fig. 105.—*Amphorophora hibernaculorum* Boyer de Fonscolombe. Alate ♀. A. Antenna; B. Cornicle; C. Cauda; A2. and B2. varieties; D. Head and part of antenna; E. Cornicle of Apterous female.

with 6 pairs of long lateral hairs and 2 dorsal median ones near apex. Anal plate yellowish. Femora and tibiæ with fine, moderately long hairs, especially the latter. Wings with yellowish insertions; veins brown and yellowish-brown; stigma brown.

Length 2.5 to 3.5 mm.

Apterous viviparous female. Green; apices of segments iii. to v. of antennæ dusky, also apices of cornicles, tibiæ and all the tarsi. Eyes deep red. Antennæ as long as or longer than body; segment i. much larger than ii., both with a few hairs; iii. much longer than iv., not so long as vi., with 3 to 6 round sensoria near base; iv. a little longer to same length as v.; vi. with basal area about one-fifth of v.; flagellum long; a few hairs on all segments. Cornicles about as long as segment iii. of the antennæ, expanding basally, swelling slightly towards apex, where it is constricted; apex reticulate over darkened area. Cauda large, acuminate, constricted towards base on each side, more than half the length of cornicles, with several long lateral hairs and 2 sub-apical ones. Rostrum reaching to or just beyond second coxæ, dusky at apex. Legs long, with numerous hairs on femora, tibiæ and tarsi. Scattered hairs over body.

Length 2.4 to 2.6 mm.

Apterous viviparous female. Boyer's description is as follows: "Green. Antennæ less than half length of body, darkened towards the apex. Cornicles very long, green. Cauda also very long. Legs green, dark at the knees and tarsi."

LOCALITIES. Stouting, Kent, ii. to iv. 14 (Duffield); Wye, iii. 24; St. Leonard's-on-Sea, 12 v. 23 (F.V.T.); France (Boyer).

FOOD PLANTS. *Daphne laureola* and *Daphne sp ?* (F.V.T.); *D. indica* (Boyer).

Observations. This may be Boyer's *Aphis hibernaculorum* found by him on *Daphne indica* in February in an orangery in France. He describes the antennæ of the apteræ as being less than half the length of the body; my specimens show them as long or longer, but in one or two slightly shorter. The specimens sent me in 1923 by the Ministry of Agriculture in April, were producing a sticky mass, many soon became alate. I originally placed this in *Macrosiphum* and on account of the reticulate apices perhaps it should remain there.

Amphorophora cosmopolitanus Mason.

Aphis lactucæ Kaltenbach.
Rhopalosiphum lactucæ Passerini.
Rhopalosiphum lactucæ Buckton.
Rhopalosiphum ribis Buckton (non-Linn.).
Macrosiphum lactucæ Sanborn.
Siphonophora lactucæ Thomas.
Nectarophora lactucæ Oestlund.

Kaltenbach, Mono. Pflanz., 37 (1843) ; Passerini, Aphid. Ital. 19, 20, 1 (1863) ; Buckton, Mono. Brit. Aphid., II., 9, 10, pl. XXXIX. and 10, 12, pl. LX. (1877) ; Ferrari, Aphis Liguriæ, 60, 26 (1872) ; Thomas, 8th Rept. Ill. St. Ent., 60 (1879) ; Oestlund, Minn. Geol. and N.H. Surv. Bull., 4, 85, 91 (1887) ; Schouteden, Ann. d. l. Soc. Ent. Belg., 44, 115, 119 (1900) ; Schouteden, Mém. Soc. Ent. Belg., XII., 236, 5 (1906) ; Schouteden, Marcellia, V., 11, 98 (1903) ; Theobald, Journ. Eco. Biol., VII., 3, 105, pl. III. (1912) ; Jackson, Scott, Nat. 159, Sep.-Oct., 1919 ; Blanchard, Physis. Buenos Ayres, V., 20, 207, July (1922) ; Das, Mem. Ind. Mus., VI., 163 (1918) ; Mason, Proc. U.S. Nat. Mus., Vol. 67, 16 (1925), figs. 14-26 and 33-44 ; Moreira, Pulgões do Brasil. Bol. 2, Ins. Bio. d. defensa Agri., 23 (1925).

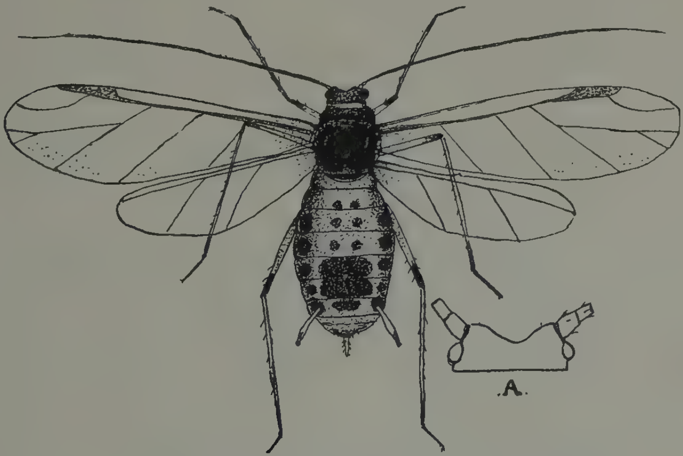

Fig. 106.—*Amphorophora cosmopolitanus* Mason.
Alate viviparous ♀; A, Head.

Alate viviparous female (Lactuca form). Head and thorax deep shiny brown to black. Pronotum yellowish-green to black. Abdomen yellowish-green to green, with an irregular dark broken area on the posterior half, 3 pairs of smaller dark spots in front and 3 large and 1 small dark lateral spots, a large dark patch at the base of the cornicles. Cauda pale yellow. Cornicles swollen, yellow, apices faintly dusky and reticulate; the few apical reticulations being laterally elongate. Antennæ dark brown to black; segment iii. with 25 to 35 sensoria; iv. with 13 to 20; v. with 3 to 6, mostly basal. Legs yellowish-green, apices of femora and tibiæ dark, also the tarsi; femora and tibiæ, especially the latter with fine short hairs. Wings with yellowish-brown stigma.

Length 2 to 2.5 mm.

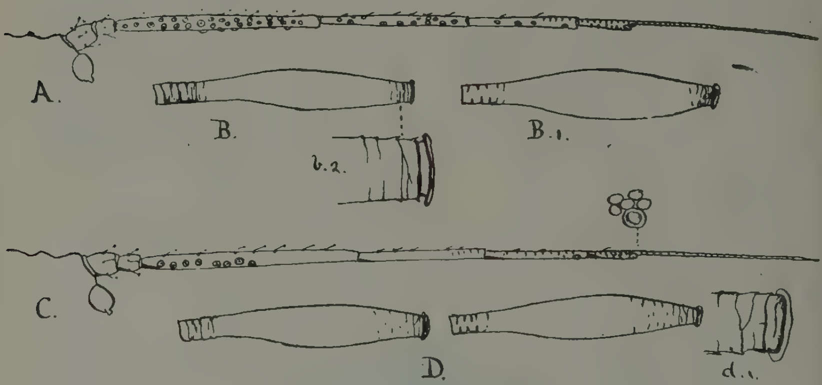

Fig. 107.—*Amphorophora cosmopolitanus* Mason.
A. Antenna; B. Cornicles of Alate viviparous ♀; C. D. of Apterous ♀;
B.1. variety of cornicle.

Apterous viviparous female. Green to yellowish-green, shiny. Antennæ green; apices of segments dusky; iii. with 6 to 20; sensoria near base. Cauda green. Cornicles green, reticulate at apices. Eyes red. Legs yellowish-green; tarsi dusky and to some extent the apices of the femora and tibiæ.

Length 1.8 to 2 mm.

Alate viviparous female (Ribes form). Similar to the first, but the dark abdominal area is not quite so large in some specimens and there are traces on the first two to four segments of sub-median dark spots.

Length 2 to 2.5 mm.

Apterous viviparous female. Green, somewhat deeper coloured than in the *Lactuca* form. Segment iii. with 1 to 4 small sensoria near base.

Length 2.3 to 2.7 mm.

The *return migrant* on *Ribes* in the autumn has sensoria on iii., iv. and v., and comparatively short, swollen cornicles.

Male. Alate. Head and thoracic lobes black. Abdomen green, with 4 transverse dark broken bars, sometimes reduced to spots, and 3 large dark lateral spots, another at base and caudad of cornicles, and a fifth behind it. Antennæ dark, longer than body; segment i. wider than ii., but about the same length; iii. with 68 to 75 sensoria over its whole length; iv. about as long

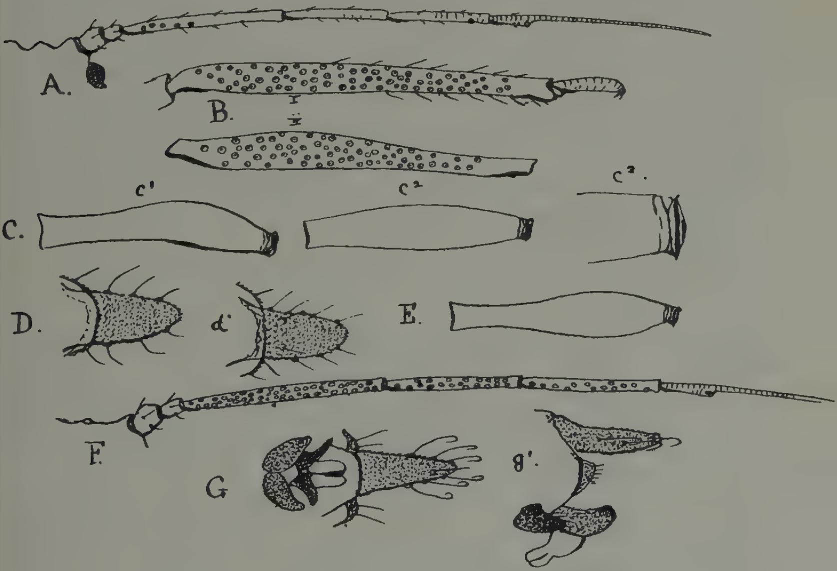

Fig. 108.—*Amphorophora cosmopolitanus* Mason.

A. Head and antenna; B. Hind tibiæ; C. Cornicles; D. and d¹ Cauda of Ovi. ♀; E. Cornicle of ♂; F. Head and antenna; G. dorsal; g¹ lateral view of genitalia.

as v., with 22 to 28 sensoria, scattered all over it; v. with 11 to 14 sensoria; vi. much longer than iv. + v., its flagellum long and thin, basal area small. Cornicles black, swollen in the middle or apical half; moderately long. Cauda dusky with markedly curved or bent hairs. Legs long, green, apices of femora and tibiæ and the tarsi dark. Wings very broad, about twice the length of body; stigma grey, veins brown; insertions yellowish-brown. Rostrum short, dusky.

Length 1.6 to 1.9 mm.

Oviparous female. Apterous; clear, transparent greenish-yellow when young, to yellow and shiny when mature. Antennæ pale, a little shorter than body, with dusky bands on apices of segments iii. to v.; apex and base of vi. dusky; i. larger than ii.; iii. nearly twice as long as iv., with 0 to 6 sensoria and scattered hairs; iv. about as long as v., which has a single sub-apical sensorium; vi. longer than iv. + v.; its basal area about half the length of v. Eyes black. Cornicles pale, more than twice the length of the cauda, apex with a few narrow reticulations and imbrications below, slightly swollen in centre. Cauda pale, with transverse lines of fine bristles; 3 long hairs one side and 4 the other, and now and then an extra hair. Legs green, the fore and mid tibiæ dusky at apex; hind tibiæ dusky, broad, with numerous sensoria over more than three-fourths of the length; hairy on the apical half; sensoria round and small.

Length 1.4 to 2.0 mm.

The young oviparous females are very pale and more transparent and show no tibial sensoria and the tibial hairs are longer when very young.

Nymphs. All green or yellowish-green; head and thorax often darker than abdomen. Wing cases green.

FOOD PLANTS. Currants, and Gooseberries (*Ribes spp.*); Lettuces (*Lactuca spp.*); Sowthistles (*Sonchus oleraceus*, *S. asper*, and *S. arvensis*); *Cichorium endivum*; *Lapsana communis*; *Picris hieracioides*.

LOCALITIES. Widely spread over Britain. On the Continent in France, Belgium, Italy, Russia and Norway. I found it once in great abundance on *Sonchus* at Bergen in 1890. Blanchard also records it from Buenos Aires, Moreira from Rio de Janeiro and Das from Lahore, India, on *Sonchus*.

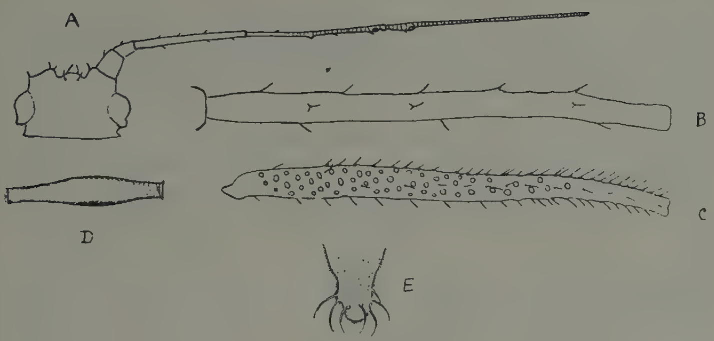

Fig. 109.—*Amphorophora cosmopolitanus* Mason.
A. Head and antenna of oviparous ♀; B. Segment of iii. further enlarged; C. Hind tibia; D. Cornicle; E. Cauda (Miss Jackson).

Observations. Buckton treated Kaltenbach's *Aphis lactucæ* and the *Rhopalosiphum ribis* Linnæus as two distinct species. Buckton's *R. ribis* is not Linnæus' *A. ribis*, which is *Capitophorus ribis.* Schouteden pointed out that Buckton's *R. ribis* was the same as Kaltenbach's *A. lactucæ.* The sexual form is *ribis*, which winters in the egg stage on Red and Black Currants, especially on the former and also on the Gooseberry. The ova hatch in March and by April the apteræ in some years have increased to such an extent that they do a great deal of harm. When present in numbers they cluster on the tops of the shoots and form a loose tuft of leaves, often so curled that one cannot see the insects. This I especially noticed in May, 1914. They also live under the red blisters on currant leaves, where *Capitophorus ribis* also shelters. During May, alatæ occur. The earliest note I have of the occurrence of alate females is May 3rd, the latest June 27th. These winged forms fly off to lettuces, sowthistles and other plants mentioned, and there produce quantities of living young, which, remain there until September and on into late October, and rarely into November, when alatæ appear and these return migrants fly to *Ribes* and produce apterous oviparous females. These may be found as long as any leaves hold on the currant and gooseberry bushes. The latest date of finding males was November 24th and the last oviparous females on December 2nd. The males arrive on the currants as alatæ. There is considerable difference between the young ovigerous females and the mature ones; the former show no tibial sensoria and are paler and semi-transparent; hind tibiæ of pubescent females dusky and densely crowded with sensoria. The males vary to some extent, but usually antennal segments iii. to v. have sensoria densely packed together; now and then those on v. are much reduced and in one male I have there is only the usual sub-apical one. The body markings also vary, these may be 3 to 4 black lateral spots before the cornicles and the dorsal markings vary almost from bars to spots. On one or two occasions I have noticed that the males are almost black. The females get very excited when a winged male alights either beneath or above a leaf and often cluster around him. At other times they seem to pay no attention whatever. The males also are active on the wing at times and at others remain quite sluggish on the leaves. Miss Jackson notes that the alate viviparous females were common on gooseberry in the beginning of August at Swordale, Evanton; but unlike those taken on sowthistles the previous year, they exhibited melanic tendencies, the cornicles varying from yellowish brown to black, but being more frequently dusky-brown to black.

NATURAL ENEMIES. The chief enemies are Syrphid larvæ, including *Syrphus ribesii*, *S. balteatus* and *Catabomba pyrastri*. Miss Jackson also records mortality in Scotland from parasitic fungi, including: *Empusa* (*Entomophthora*) *aphidis* Hoff and *Empusa* (*Triplosporium*) *fresenii* Nowakowski.

AMPHOROPHORA LONICERÆ Siebold.

Aphis loniceræ Siebold.
Rhopalosiphum loniceræ Koch, etc.
Siphocoryne loniceræ Del Guercio.

Siebold, Forieps, Notiz., XII., 305 (1839); Boyer, Ann. Ent. Soc. Fr., X., 167, 6 (1841); Kaltenbach, Mono. Pflanz., 48 (1843); Koch, Die Pflanz, 38, figs. 49-49 (1854); Mosley, Gard. Chron., I., 628 (1841); Walker, List. Homop., 992, 95 (part) (1852); Del Guercio, Redia, VII., 331 (1911).

Alate viviparous female. Yellowish-green of various shades, head and prothoracic lobes black; two dusky spots sometimes present on the pronotum. Abdomen with a large median dark brown patch before and between the cornicles; 1 or 2 irregular dark spots in front and 3 large and 2 smaller black lateral spots and a large black lateral patch behind the cornicles, which now and then have a black patch at their base. Antennæ as long as or a little longer than body, dark brown ; segment i. larger than ii. ; iii. nearly twice as long as iv., with 58 to 64 sensoria spread over its whole length ; iv. as long as v., with 20 to 22 sensoria ; v. with 7 to 8 sensoria, as well as the usual sub-apical one ; vi. with a long thin flagellum, somewhat paler in some specimens than others.

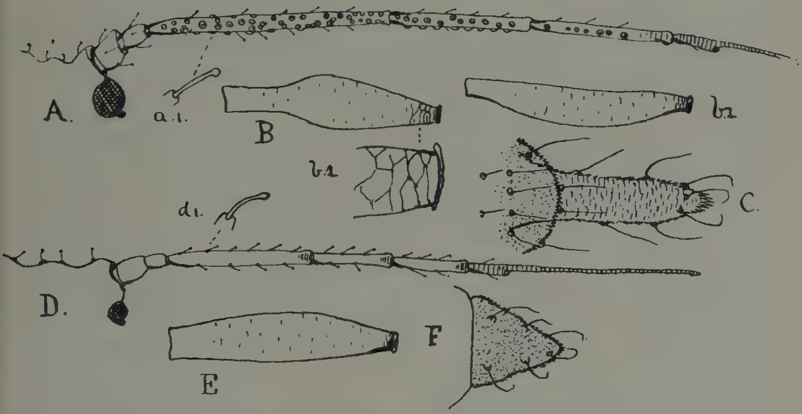

Fig. 110.—*Amphorophora loniceræ* Siebold.

A. B. C. Alate ♀. D. E. F. Apterous ♀. A. Head and antenna of alate ♀ ; a.1. enlarged hair ; B. Cornicle ; b.1. variety ; b.2. Apex further enlarged ; C. Anal plate and cauda ; D. Head and Antenna of Apterous ♀ ; d.1. further enlarged hair ; E. Cornicle of nymph.

Cornicles rather long, swollen in middle, brownish, paler in the middle, some have them dusky yellowish with darkened apices. Cauda pale yellowish to pale yellowish-brown, about half the length of cornicles. Legs yellowish to yellowish-green, with apices of femora and tibiæ dark ; tarsi dark. Wings broad, considerably longer than body ; veins and stigma yellowish- brown.

Length 2.5 to 2.8 mm.

Apterous viviparous female (*nymph*). Green to yellowish-green, shiny ; antennæ longer than body, greenish, apices of segments dusky ; iii. a little longer than iv. ; iv. equal to v. ; vi. with small basal area and long flagellum, longer than iv. + v. ; hairs capitate. Eyes small and black. Legs yellowish-green to yellow ; apices of femora and tibiæ sometimes darkened ; tarsi dark. Cornicles brownish to pale brownish yellow, thick and swollen in middle. Cauda very short, pale yellowish-brown.

Length 2 mm.

FOOD PLANTS. Honeysuckle (*Lonicera xylosteum* and *L. tartarica*); *Lapsana communis.*

LOCALITIES. Wye, Cambridge, Ely, Exeter, York, Wragby, Cromer, Worcester (F.V.T.).

Observations. The alate viviparous females, which are very marked, as far as I can see, are just the same on *Lapsana* as on *Lonicera,* but the apteræ differ. The Lapsana forms are paler than the Lonicera ones; their antennæ are frequently longer than body and are markedly annulated with dark bands; whilst in the Lonicera forms they are a little shorter than the body and brown or greenish-brown, but now and then the distinct annulations occur. As far as I have traced the life-cycle of this species, it appears that the alatæ migrate in June from *Lonicera* to *Lapsana* and return to the Honeysuckles in August, where I presume the sexuales occur, but I have never found them. I have, however, found the quite young larvæ on Honeysuckle in the spring. This species is much preyed upon by Syrphid larvæ, especially *Catabomba pyrastri* and *Syrphus balteatus.* It occurs in dense masses on the stems, leaves and blossoms of the Honeysuckles and produces much "honey-dew."

Kaltenbach refers to it as occurring on *Lonicera* from May to October.

AMPHOROPHORA ACONITI Van der Goot.

Rhopalosiphum aconiti Van der Goot.

Van der Goot, Tijd. v. Ent., LV., 73-75, figs. 6 and 7 (1912); Beit. z. Kennt. d. Holl. Blattlause, 140 (1915); Theobald, Entomologist L., 81 (1917); Mason. Proc. U.S. Nat. Mus. 67, 7, figs. 169-173 (1925).

Apterous viviparous female. Rich green to bluish-green. Eyes deep red. Antennæ dark, except at base of segment iii. Cauda and cornicles black. Legs yellowish-white to green, except apical half of femora, apex of tibiæ and the tarsi which are black. Antennæ not quite to almost length of body; segment i. larger than ii., very dark, both with short hairs; iii. long, with 25 to 35 round sensoria, not quite reaching to the end; hairs numerous, short, a few slightly capitate; iv. about as long as v., both with short hairs. Cornicles about as long as antennal segment iv., and twice as thick, somewhat swollen in middle. Cauda large, not quite so long as the cornicles, much broader, spinose and with numerous fine hairs apically. Anal plate dark, very spinose, rather small. Rostrum reaching nearly to third coxæ, acuminate. A few hairs on body.

Length 3.8 to 4 mm.

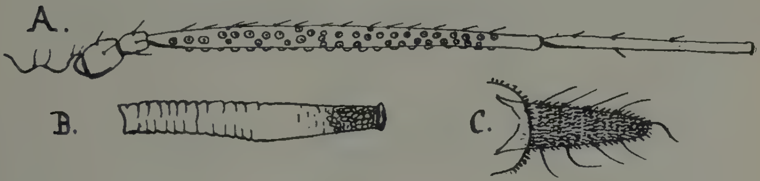

Fig. 111.—*Amphorophora aconiti* V.d.Goot.
Alate ♀.
A. Head and base of antenna; B. Cornicle; C. Cauda.

Alate viviparous female. Head and thorax shiny black. Abdomen rich green to bluish-green. Antennæ black, except base of segment iii. Cornicles and cauda black. Legs as in apterous female; tibiæ very hairy. Antennæ a little longer than body; segment i. much larger than ii., with a few hairs; iii. a little longer than iv. + v., with 45 to 60 round sensoria over most of its length; segments iv. and v. without sensoria, except for the usual sub-apical one on v.; iv. a little longer than v.; flagellum longer than iv. + v. Cornicles about as long as antennal segment iv., cylindrical, in some showing slight swelling in mid region or apical half; apex reticulate. Cauda not quite so long as cornicles, much thicker, spinose, with some fine lateral hairs. Wings normal. Rostrum reaching to about third coxæ. Both with a few scattered short hairs.

Length 3.8 to 4 mm.

FOOD PLANTS. *Aconitum napellus* and on cultivated Aconites.

LOCALITIES. Birkenhead, 1 x. 22; Yorkshire, per Ministry of Agriculture, 19 vi. 11 and 27 vii. 16; Harpenden, 10 vi. 20 (Rymer Roberts); Holland (Van der Goot).

Observations. Numbers of alatæ were sent me by Mr. Fryer from Yorkshire. The relative length of the cornicles and cauda varies. In some the cauda and cornicles are almost the same length, in others the cauda is a little shorter. Van der Goot gives them the same length. It is a large, beautifully coloured species, varying from rich green to bluish-green and black. The cornicles and cauda resemble *Megoura*, but the head *Amphorophora* and I have provisionally placed it in this genus.

Two other species have been described from Aconites, namely *Aphis napelli* Schrank (1801) from *A. napellus* in Europe, and *Myzus junckianus* Karsch (1887) on *A. cammarum* from America.

AMPHOROPHORA TRITICUM Theobald.

Bull 2 n. se. S.E.A. Coll., Wye, 7, fig. 2 (1923).

Apterous viviparous female. Green; abdomen with 7 pairs of thin lateral spots and 2 median pairs just before the cornicles. Antennæ shorter than body; green with dusky apices. Eyes black. Cornicles swollen, green, dusky at apices. Cauda pale green, about two-thirds as long as the cornicles. Legs rather long, green, with apices of tibiæ and the tarsi dusky. Segment i. of antennæ wider and slightly longer than ii.; iii. longer than iv. with 19 to 20 sensoria, reaching to nearly the apex; iv. a little longer than v.; vi. slightly longer than iv. + v.; arising from moderately formed frontal lobes. Hairs slightly swollen at apex. Cornicles with a few faint reticulations at the apex. Cauda with three pairs of lateral chaetæ and one median subapical one. Proboscis reaching to the third coxæ.

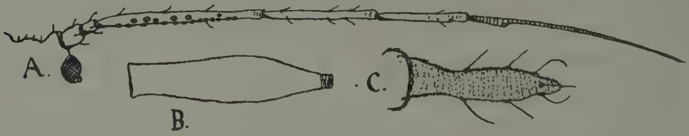

Fig. 112.—*Amphorophora triticum* Theobald.
Apt. ♀. A. Head and antenna; B. Cornicle; C. Anal plate and cauda. (C. more magnified than B.)

Length 2 mm.

FOOD PLANT. Wheat.

LOCALITY. Wye (19 vi. 11).

Observations. I at first took this species to be a variety of *Macrosiphum granarium*, but the swollen cornicles at once separate it and with the caudal and head structure place it in *Amphorophora*. So far I have only found it in this one locality.

Genus RHOPALOSIPHONINUS Baker.

Eucarazzia Del Guercio.

U.S. Dept. Agri. Bull. 826, 58, pl. IV., D-F (1920); Del Guercio, Redia, XIV., 135 (1921) (with *calthæ* included).

Baker created this genus with Davidson's *latysiphon* as type. Several British species previously placed in the genus *Rhopalosiphum* come in this genus, including the very marked *calthæ* of Koch and my *tulipælla*.

The characters are: Head with prominent frontal tubercles, armed with spines and projecting inwards. Cornicles large, cylindrical at the base, then abruptly and markedly swollen and becoming abruptly cylindrical near the tip. Cauda shorter than the cornicles and more or less conical. Antennæ of six segments and with round sensoria. Venation normal.

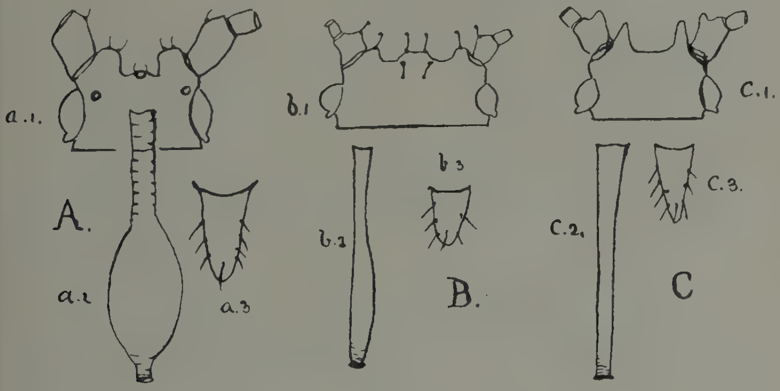

Fig. 113.

A. a^1. Head, a^2. Cornicle, a^3. Cauda of *Rhopalosiphoninus*.
B. The same of *Capitophorus*. C. The same of *Phorodon*.

BRITISH SPECIES OF *Rhopalosiphoninus*.

Rhopalosiphoninus calthæ Koch.
,, *latysiphon* Davidson.
,, *ligustri* Kaltenbach.

Rhopalosiphoninus waltoni Theobald and Walton.
,, *pseudorumicis* Theobald.
,, *tulipælla* Theobald.
,, *lupulinus* sp. nov.

FOOD PLANTS OF *Rhopalosiphoninus*.

Caltha palustris	R. calthæ Koch.
Convolvulus sp.	R. latysiphon David.
Hedera helix	R. waltoni Theo. and Walt.
Fragaria vescaria	R. lupulinus sp. nov.
Humulus lupulinus	R. lupulinus sp. nov.
Ligustrum vulgare	R. ligustri Kalt.
Rumex sp.	R. pseudorumicis Theob.
Tulipa	R. tulipælla Theob.
Viola spp.	R. tulipælla Theob.
Vinca major	R. latysiphon David.
Vinca minor	R. latysiphon David.

KEY TO SPECIES OF BRITISH *Rhopalosiphoninus*.

Alate viviparous females.

1. Wings clear.

Entirely black to deep brown; iii. 36 to 45 sensoria; iv. with 4 to 6. *calthæ.*

Deep green; head, most of thorax and cauda black; abdomen with large dark area on dorsum, black lateral spots and some bars behind. Cornicles dark; iii. with 13 to 18 sensoria. *latysiphon.*

Bright yellow to pale yellowish-green; head, and thoracic lobes black to brown; body with some brown transverse bars, which often form a patch between cornicles; dark brown lateral spots; iii. with 22 to 25 sensoria; iv. with 4 to 8. *ligustri.*

Abdomen green to deep olive green, with large dark lateral spots and somewhat darkened in middle; head and thorax dark. Cornicles pale olive green, dusky at base and apex. Cauda pale green; iii. with 53 to 56 sensoria; iv. with 16 to 18; v. with 3 sensoria. *waltoni.*

Dull yellowish-green; head and thorax dark; a large dark patch on posterior area of abdomen, 2 dark bands in front.

Cornicles and cauda deep green. Segment iii. with 11 sensoria. *lupulinus.*

Dark, except base of legs and most of tibiæ ; iii. with 9 to 12 sensoria. *pseudorumicis.*

2. Wings with dusky bordered veins.

Head and thorax jet black ; 2 pale bands on latter. Abdomen shiny, dusky ochreous to dirty greenish-brown, black median bars, merging into more or less a mass before cornicles ; black lateral spots. Cornicles dark, with pale areas. Cauda dusky ; iii. with 10 to 13 large sensoria. *tulipæella.*

Apterous viviparous females.

Black to deep brownish-black ; iii. with 19 to 25 sensoria. *calthæ.*

Deep shiny greenish-brown ; dark median transverse bars on abdomen, some more or less fused into a dark mass before cornicles and a dark bar or so behind, small black spots each side. Cornicles dark, paler in middle. Cauda pale brownish-green ; iii. with 3 to 4 sensoria. *tulipæella.*

Shiny, bright yellow or yellowish-green, smooth ; cornicles yellow to green, apices dusky. Cauda yellow. *ligustri.*

Deep olive green ; cornicles smoky ; cauda pale green ; iii. with 2 sensoria near base. *waltoni.*

Pale dull green to olive green ; body with paired dark spots, the median pair merging into transverse bars or into a large dark dorsal patch. Cauda dark. Cornicles dark, paler in middle ; iii. with 0 to 4 sensoria. *latysiphon.*

RHOPALOSIPHONINUS CALTHÆ Koch.

Rhopalosiphum calthæ Koch.

Koch, Die Pflanz, 48, figs. 61, 62 (1854) ; Schouteden, Aphid. Belg., 234 (1892) and Marcellia, V., 11, 92 (1903) ; Theobald, Entomologist, XL., 354 (1911).

Alate viviparous female. Head, thorax, abdomen and cornicles entirely black to deep brown. Legs deep yellowish-brown with darker apices to femora and tibiæ ; tarsi dark ; shiny. Body widest just before cornicles ; domed. Antennæ longer than body, arising from distinct frontal processes ; segment i. much wider but not longer than ii. ; iii. long and thin, nearly as long as vi., with 36 to 45 sensoria spread over its whole length. somewhat paler at base ; iv. with 4 to 8 sensoria, a little longer than v. ; basal area of vi. less than half v. ; flagellum long and thin, about as long as iii. Cornicles long, narrow on basal half, much swollen on apical, but constricted just at apices, where they are reticulate ; apices widely flared. Cauda black ; 2 to 3 pairs of lateral hairs ; pointed ; short. Wing insertions yellowish ; stigma greyish-brown ; veins brownish. Furcation of wings subject to much variation.

Length 3 mm.

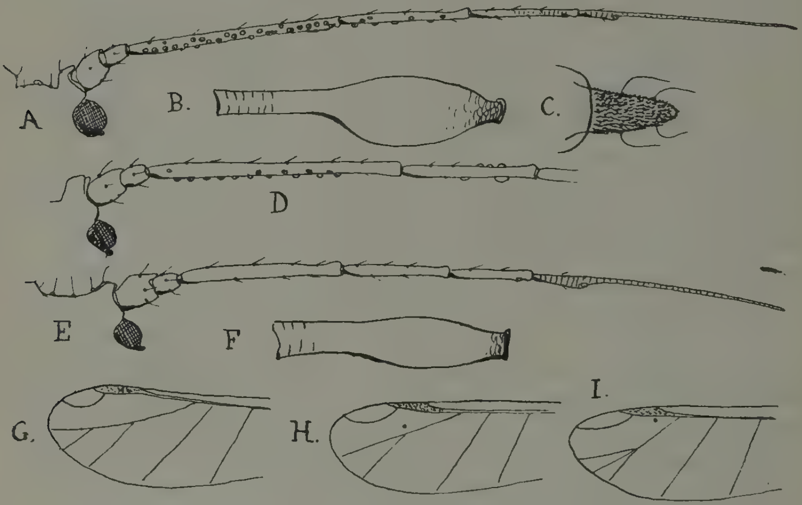

Fig. 114.—*Rhopalosiphoninus calthæ* Koch.
A. B. and C. Alate ♀; D. Apterous female ; E. and F. Nymph ; G.-I. Variations in venation.

Apterous viviparous female. Black to deep brownish-black ; traces of paler bands on thorax. Antennæ not quite so long as body ; black, except base of segment iii. ; ii. also paler ; i. longer and wider than ii., arising from marked porrected frontal lobes ; iii. nearly twice as long as iv., with 19 to 25 sensoria, along one side, not quite reaching apex ; iv. with a few sensoria on apical half. Cornicles and legs as in alatæ. Cauda black, shorter than in alate female. Legs very hairy. Some antennal hairs slightly capitate.

Length 3 mm.

FOOD PLANT. Marsh Marigold (*Caltha palustris*).

LOCALITIES. Wye, v. to vii. 1910 and 1911 to 1913; Oxford, vi. 12; Godalming, 7 vi. 13 (F.V.T.); Reddish Vale and Burnage, Lancs., Sirines and Delamere, Cheshire (Britten); Rixensart, Brussels (Schouteden); Germany (Koch).

Observations. This very marked Aphid appears to be common locally in certain years in Britain. It seems to have escaped observation, for neither Walker nor Buckton mention it. These plant lice occur in round patches varying from the size of a sixpence to that of a shilling on the under sides of the leaves, usually the largest leaves, of the Marsh Marigold and are densely packed together. So far I have only found it on plants growing in dark places, where alders and willows form a canopy overhead. The young are brown, but soon darken, and the adults have a hard black shiny appearance. I have counted as many as forty individuals crowded together in each patch. Although I have now known it for some fifteen years, I have failed to trace its life cycle or alternate host plant. It is first noticed at Wye in late May as apterous females. Alatæ appear in July, usually about the 20th. The colonies of apteræ occur in great numbers through June and at the end of the month, nymphæ commence to appear. Although most alatæ were found in July, many apteræ occurred until the plants died down. The round pale spots they produce show faintly on the upper sides of the leaves now and then. At other times they do not affect the foliage at all. It is found on both old and young leaves and a single colony may split up into several colonies. The wing venation is very variable, often it is asymmetrical in the same insect.

RHOPALOSIPHONINUS LATYSIPHON Davidson.

Amphorophora latysiphon Davidson.

Davidson, Journ. Eco. Ent., V., 408 (1912); Theobald. Ent. Mo. Mag. lx. 3rd Se. 12, fig. 1 (1924).

Alate viviparous female. Various shades of deep green; head, pronotum, thoracic lobes, scutellum, frontal tubercles and cauda black. Abdomen with a large sub-quadrate dark area on dorsum and some black transverse bars caudad and black lateral spots.

Cornicles either dark, almost black, or slightly paler in the middle. Eyes deep red. Legs olive to yellowish, or greenish-brown; apical half of femora and tibiæ dark and all the tarsi. Venter same colour with black sterna and dusky coxæ. Antennæ longer than body; segment i. larger than ii.; iii. longest, with 13 to 18 round sensoria in a more or less irregular row along one side;

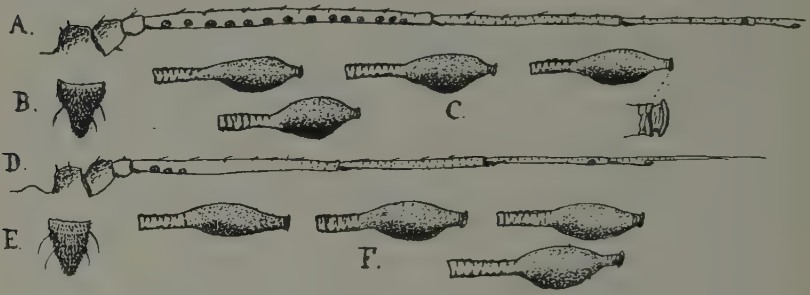

Fig. 115—*Rhopalosiphoninus latysiphon* Davidson.
A. Antenna; B. Cauda; C. Cornicles of Alate viviparous ♀; D.-F. Of Apterous viviparous ♀.

iv. a little longer than v.; basal area of vi. but little longer than i.; flagellum a little shorter than iv. Cornicles much swollen on apical half, a few narrow reticulations at apices; basal stem to some extent crenulated; moderately long. Cauda bluntly triangulate, about one-third length of cornicles. Rostrum green, apex dark, reaching to second coxæ.

Length 2.3 to 3.5 mm.

Apterous viviparous female. Pale dull green to olive green; abdomen with paired dark spots, the median pair merging into transverse bars or into a large dark dorsal patch. Pronotum and base of antennæ dark. Legs same colour as body, apices of femora, tibiæ and the tarsi dark. Eyes deep red. Cornicles as in alate female, varying from all black to black at apices and base, paler in middle. Cauda dark. Antennæ longer than body; segment iii. with 0 to 4 sensoria on basal area, which in some specimens is slightly enlarged. Rostrum pale green to olive green, apex dusky; reaching to second coxæ.

Length 2.2 to 2.6 mm.

Food Plants. Periwinkles (*Vinca major* and *V. minor*); *Convolvulus arvensis* and *Convolvulus sp.*

Localities. Wye, 23-30 iv. 23 (F.V.T.); Barnsley, Yorks., v. 25 (Dallman); California, U.S.A. (Davidson).

Observations. This marked species was described by Davidson from California in 1912. In April, 1923, I found it in masses on Periwinkles growing around Wye Court, especially on *Vinca minor*, the foliage of which they distorted very much. A few only occurred on the large Periwinkle. Viviparous females, nymphæ and alatæ occurred together, whilst the apteræ showed much variation in markings, the alatæ were all similarly adorned. Whilst *Myzus vincæ (convolvuli)* was as abundant as usual on *V. major*, this small species was never as plentiful as on *Vinca minor*. They especially attacked the deep hidden growth and the tender stems and leaves rising under the ivy against the walls of the house.

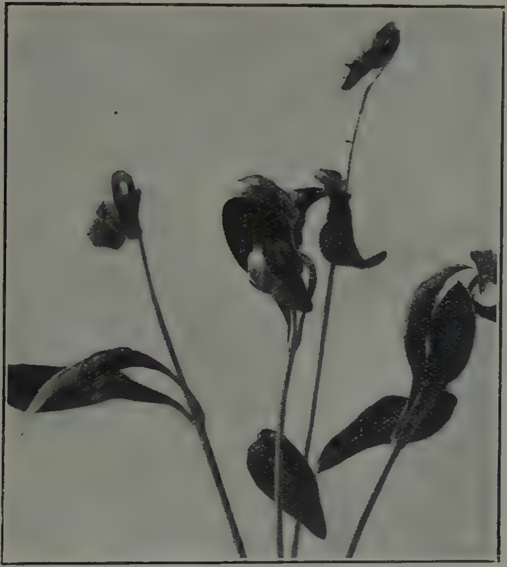

Fig. 116.—Small Periwinkle (*Vinca minor*) with leaf curl produced by *Rhopalosiphoninus latysiphon.*

RHOPALOSIPHONINUS LIGUSTRI Kaltenbach.

Aphis ligustri Kaltenbach.
Rhopalosiphum ligustri Passerini.

Kaltenbach, Mono. Aphid., 48, 34 (1843) ; Walker, List Hom. (B.M.), IV., 999 (1852) ; Koch, Die Pflanzen., 46, figs. 59, 60 (1854) ; Passerini, Aphid. Ital., 20 and 21, 4 (1863) ; Ferrari, Aphid. Liguriæ, 61, 27 (1872) ; Buckton, Mono. Brit. Aphid., II., 13, pl. XLI., figs. 4 and 5 (1877) ; Schouteden, Cat. Aphid. Belg., 236 (1906) ; Theobald, Entomologist, XLIV. (1911) ; Theobald, Hast. and E. Sussex Nat. II., 1, 16 (1912).

Alate viviparous female. Bright yellow to pale yellowish-green, with brown head and thoracic lobes ; abdomen with some brown transverse bars, which frequently form a patch between the cornicles and with four prominent lateral darker brown spots before the cornicles. Eyes black. Three prominent stemmata. Antennæ as long as or a little longer than body, brown except two basal segments, which are yellow to yellowish-green ; segment i. larger than ii. ; iii. considerably longer than iv., with 22 to 25 sensoria, mainly on one side of its whole length ; iv. a little longer than v., with 4 to 8 sensoria ; vi. longer than iv. + v. ; basal area of vi. not nearly as long as v. Cornicles dark, rather long, swollen about the middle, with a few transverse lines across apex and with faint imbrications below ; projecting beyond cauda which is yellow with two pairs of lateral hairs and a dorsal pair

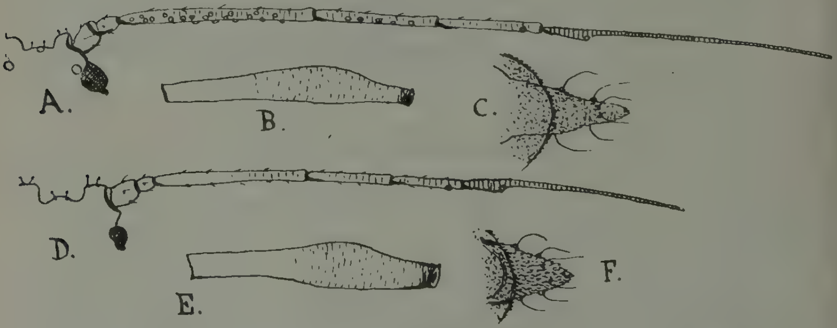

Fig. 117.—*Rhopalosiphoninus ligustri* Kaltenbach.

A. Head and antenna of Alate ♀ ; B. Cornicle ; C. Anal plate and cauda ; D. Head and antenna of apterous ♀ ; E. Cornicle ; F. Cauda.

towards apex, rather short and bluntly pointed. Legs yellowish with dusky areas at the apices of femora and tibiæ; tarsi dusky. Wings large, rounded at apices; insertions and cubitus yellow; stigma greyish-yellow; veins pale yellowish-brown.

Length 1.5 to 1.8 mm.

Apterous viviparous female. Shiny, bright yellow or yellowish-green, smooth. Antennæ about as long as body to a little less than its length; green; arising from prominent frontal tubercles, dusky at apex, in some the segments tipped with grey; segment i. broader and longer than ii.; iii. much longer than iv.; iv. a little longer than v.; vi. dusky brown, a little longer than iv. + v., basal area about half of v. Cornicles long, yellow to green, dusky at apices, swollen just past the middle, with a few terminal transverse striæ and faint imbrications. Cauda yellow, less than half length of cornicles, with two pairs of lateral hairs and two dorsal ones, near apex. Legs yellow in some the tarsi faintly dusky.

Length 1.2 to 1.5 mm.

FOOD PLANT. Privet (*Ligustrum vulgare*).

LOCALITIES. Maidstone, 26 vi. 12; Chilham, 04; Wye, viii. 01 and 05; 10 to 20 vi. and 17 and 10 xi. 10 to 25; Kingston-on-Thames, vi. 89; Cambridge, vii. 89 and x. 90; Little Hadham, x. 13; Filey, 14 viii. 92; Rothamsted, 7 x. 17; Old Roar, Hastings, 2 viii. 86 (F.V.T.); Hastings (Bloomfield); Wanstead, viii. and Norwich (Buckton); New Forest, Midhurst, Epsom, Kew, Rickmansworth, Gerrard's Cross, and occasionally very abundant on privet grown in the London area (Laing); Burton-on-Trent, 27 vi. 47 (Walker, in Nat. Mus., Ireland). Also in N. America.

Observations. This species lives under the leaves of the Privet, which the apteræ curl up. The alatæ occur in June and again in July, and return to the Privet in September, and later the sexuales occur and the females deposit their eggs there. Apterous oviparous females are abundant in November. I have seen this species so abundant on Privet hedges in the South of England that the whole foliage has been killed. It has also proved very harmful in Canada. It is difficult to keep down by spraying, as the leaves curl longitudinally very tightly around the Aphides, but by the time it is doing harm, the Privets should be clipped. Its position in this genus is somewhat doubtful.

RHOPALOSIPHONINUS WALTONI Theobald.

Ann. Rept. Lanc. and Cheshire Ent. Soc. for 1921-22 (1923), Theobald and Walton.

Alate viviparous female. Head deep olive-green; thorax deep brown, lobes black. Abdomen green to deep olive green, with large dark lateral spots and somewhat darkened in the middle. Antennæ deep olive-green to brown. Cornicles pale olive green, dusky at base, more so at apex. Cauda very pale green. Legs same colour as body, with dark femora, olive-green on apical half; apices of tibiæ and the tarsi dark. Eyes large, deep red. Stigma deep olive green; veins pale greyish-green. Antennæ longer than body; segment i. larger than ii.; iii. nearly twice as long as iv., not quite so long as v., the sensoria varying from 53 to 56 over its whole length, some small, some large; iv. a little longer than v. with 16 to 18 sensoria of uniform size, extending up to apex; v. with 3 sensoria on basal half and the usual sub-apical one; vi. with basal area nearly one-quarter of v., flagellum long. Head with small median process and well-marked small lateral ones. Eyes large. Rostrum long, rather thin, reaching to third coxæ. Cornicles large, inflated near the middle, crenulated at constricted base, a little longer than antennal segment iv., constricted at apices, a well marked transverse stria at apex. Cauda about half length of cornicles, acuminate, broadened towards apex, with 3 hairs each side near apex. Anal plate small, rather darkened, with several long hairs. Legs long and rather thin, numerous short hairs on tibiæ.

Length 2.7 mm.

Apterous viviparous female. Deep olive green; antennæ and legs paler; apices of antennæ and tibiæ dusky; tarsi dark. Cornicles smoky, large, with narrow stalk, swollen in middle, tapering to apex, two striæ at apices, stem crenulate. Cauda rather short, pale green, broad, acuminate, constricted each side towards apex, with two hairs each side. A few short stiff hairs on body and head. Legs long and thin; short hairs on tibiæ. Antennæ with segment i. larger than ii.; iii. very little longer than iv. and about half vi., with two round sensoria near base; iv. a little longer than v. ; vi. with long flagellum ; apex of v. and all vi. dark. Rostrum reaches second coxæ.

Length 2 mm.

FOOD PLANT. Ivy (*Hedera helix*).

LOCALITIES. Barmouth, vi. 12 (F.V.T.) ; Porlock, 5 vi. 15 (Crawley) ; Half-way Bridge, Bangor, 15 v. 21 and 10 i. 22 (Walton).

Observations. A marked *Rhopalosiphoninus* which occurs in company with *Aphis hederæ*, from which it can be told by its paler colour.

RHOPALOSIPHONINUS PSEUDORUMICIS sp. nov.

Alate viviparous female. Dark, except base of legs and most of tibiæ, just the apex of latter dark. Antennæ longer than body ; segment i. much larger than ii. ; iii. longer than iv., but shorter than vi., with 9 to 12 sensoria along one side, not reaching apex ; iv. a little longer than v. ; vi. with basal area about one third of v. ; flagellum long. Frontal processes of head large. Eyes large, red. Cornicles large, narrow on basal third, much swollen in middle and narrowing to apices, where there are a few marked wide reticulations. Cauda short, bluntly acuminate, with several hairs. Anal plate rounded, with several hairs. Wings faintly tinged with brown.

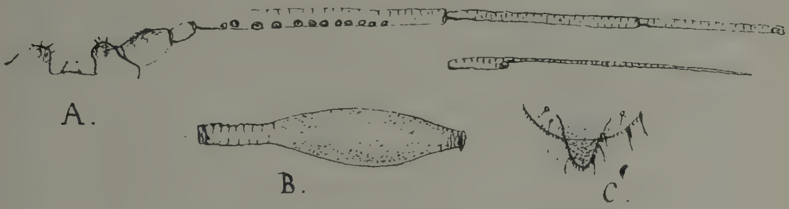

Fig. 118.—*Rhopalosiphoninus pseudorumicis* sp. nov.
A. Head and antenna of alate ♀ ; B. Cornicle ; C. Anal plate and Cauda.

Length 2 mm.

FOOD PLANT. Docks (*Rumex sp ?*).

LOCALITY. Ellerbeck, Crook, Westmorland, 26 v. 14 (Rymer Roberts).

Observations. A very marked *Rhopalosiphoninus* described from mounted specimens sent me by Mr. Rymer Roberts, but with no colour notes. It appears to be a dark species.

RHOPALOSIPHONINUS TULIPÆLLA Theobald.

Rhopalosiphum tulipælla Theobald.

Entomologist, XLIX., 146 (1916).

Alate viviparous female. Head and thorax jet black and very shiny; a pale narrow anterior pronotal band and a pale dull yellowish one behind the black pronotum. Abdomen shiny, dusky ochreous to pale ochreous or dirty greenish-brown, with black median bars, which more or less merge into a mass before the cornicles, black lateral spots. Venter of abdomen and prothorax dusky-green; meso- and meta-sternum black. Antennæ dark, almost black, but to some extent paler basally; longer than body; frontal lobes prominent; segment i. much larger than ii.; iii. longer than iv., with 10 to 13 rather large sensoria along one side in a line; iv. a little longer than v. with 2 to 6 sensoria at

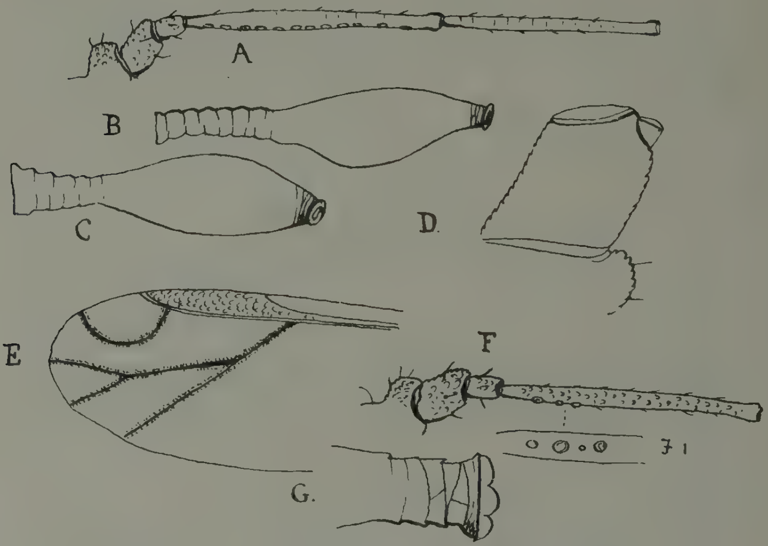

Fig. 119.—*Rhopalosiphoninus tulipælla* Theobald.
A.-E. Alate ♀; F. G. Apt. ♀. A. and F. Antennæ; B. C. and G. Cornicles; D. Basal segment of antenna; E. Apex of wing.

base; hairs short and blunt. Cornicles very markedly vasiform, dark with paler areas in places, with corrugations on basal thin region and a few broad reticulations at apices. Cauda dusky, spinose, with two pairs of lateral chætæ and one medial near apex. Rostrum reaching second pair of legs, dusky yellowish-green in the middle, black at base and apex. Legs dark, basal half of the femora dusky green. Wings with pale insertions and dark brown, almost black veins and deep grey stigma; the veins have a thin dusky area on each side due to staining of the membrane, a very marked character.

Length 2 to 2.5 mm.

Apterous viviparous female. Dark shiny greenish-brown. Head dull yellowish; pronotal band dark and a dark band on meso- and meta-notum. Dark median transverse bars on the abdomen, more or less fused into a dark mass on the region cephalad to the cornicles, and a dark bar or two behind; a line of small black spots in a groove on each side. Antennæ as long as or a little longer than the body, paler dull greenish-brown, the apex and the apices of the segments dusky; frontal processes and eyes dark. Cornicles much swollen and dark at base and apex, greenish-brown in the middle, shiny, rather long, the apex with some reticulation. Cauda rather small, acuminate, pale brownish-green, slightly spinose with three pairs of lateral chætæ. Legs shiny, long and thin, pale brownish-green, dusky at apices of femora and tibiæ

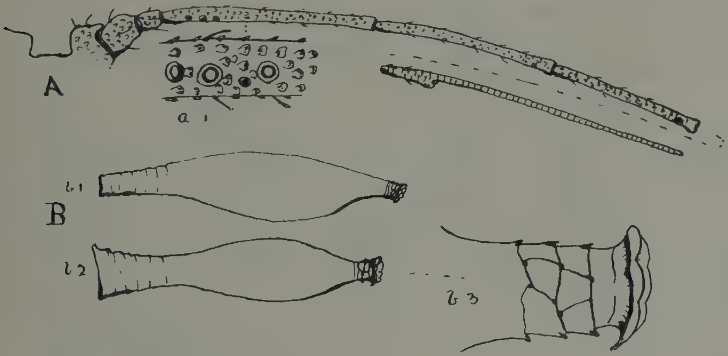

Fig. 120.—*Rhopalosiphoninus tulipælla* Theobald.
Apt. ♀. A. Antenna; a1. Enlarged surface; B. Two forms of cornicles; b3. Apex still further enlarged.

and with dusky tarsi ; tibiæ sometimes pale greenish-yellow. Venter paler brownish-green, shiny. In some specimens the dark brown areas are almost black and the whole insect has a general shiny dark appearance, until examined under a lens. The antennæ which arise from large frontal processes, have the basal segment much larger than the second ; iii. a little longer than iv., with 3 to 4 basal sensoria ; iv. a little longer than v. ; vi. about as long as iv. + v. Frontal processes, segments i. to iii., and partially iv. and v., with marked ornamentation and small lateral blunt processes (Fig. 120, *A*, *a* 1) ; hairs blunt or slightly rounded at the apex.

Length 1.5 to 2 mm.

FOOD PLANTS. Cultivated tulips and violets.

LOCALITIES. Swanley, 14 xi. 13 ; Canterbury, 9 to 28 ii. 14 ; Goudhurst, 10 iii. 14 ; Maidstone, ix. 20 ; Lancing, iv. 18 ; Merton, xii. 25 ; Beaconsfield, 1922 (S.A. Neave) ; Kew, 1924 (Laing).

Observations. I first found this Aphid at Swanley, and later in a nursery at Canterbury, where many apterous females were scattered about on tulips under glass, and again on violets in frames. Here and there the plants were covered with the young, which were bright green or yellow, mostly feeding on the upper surface of the leaves, but now and then below them. The young are very sluggish, but the apterous females run about rapidly, especially when the food supply is becoming low. I obtained the alate females from the same nursery on February 24th. They soon became busy depositing green young. I noticed that the lice from the apterous females were mostly yellow and thus easily told from those produced by the alate females. The alatæ were very sluggish. The markings show up much more plainly when placed in alcohol. The dusky staining at the sides of the black veins is very characteristic. Thomas' *Rhopalosiphum tulipæ* has been shown by Davis to be only Schrank's *Rhopalosiphum dianthi* (" Bull. Illinois State, Lab. Nat. Hist." x, art. ii., p. 106, 1913). Boyer de Fonscolombe's *Aphis tulipæ* (" Anns. d. l. Soc. Ent. Fr." x., p. 167, 7, 1841) is an *Anuraphis*.

The species described here is subject to some variation in the amount of dark markings and also in the general colour of the body, some being deep green, others dull but shiny yellow-green, others almost brown.

Specimens bred from violets from Goudhurst showed the following slight variations : The body was somewhat darker, being entirely dusky brownish with two greenish bars in front and somewhat paler on the last segments, and the four pairs of black lateral spots have paler areas around them ; the tibiæ are also paler, except at the apex, and the subcostal vein is yellowish and the vein stainings are not so marked. It also lives in the tulip blossoms and does considerable damage and may be found side by side with *Macrosiphum gei* on tulips.

RHOPALOSIPHONINUS LUPULINUS sp. nov.

Apterous viviparous female. Dull brownish-yellow to dull greenish, very small dark elongated patches each side of dorsum of abdomen and two broken rows of smaller irregular dark patches mediad of dorsum. Antennæ with 1 to 2 sensoria on segment iii. Cornicles deep olive green ; a few apical striæ ; swollen on apical half. Cauda dark ; less than half length of cornicles ; two hairs each side. Rostrum reaches past second coxæ.

Length 1.7 to 2 mm.

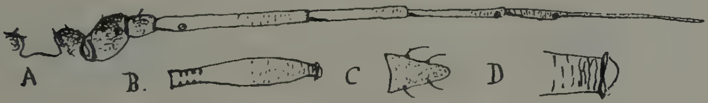

Fig. 121.—*Rhopalosiphoninus lupulinus* sp.n.
Apterous ♀. A. Head and antenna ; B. Cornicle ; C. Cauda ; D. Apex of cornicle.

Alate viviparous female. Head dark. Pronotum dark ; thoracic lobes dark ; a pale band in front and behind pronotum. A large dark patch on posterior area of the dull ochreous abdomen ; two dark bands in front of it. Antennæ brownish-green ; segments i. and ii. dark ; apices paler. Cornicles and cauda deep

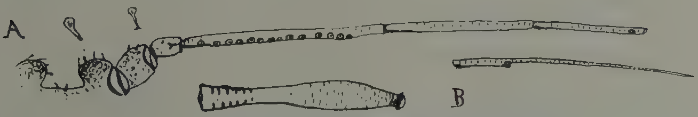

Fig. 122.—*Rhopalosiphoninus lupulinus* sp.n.
Alate ♀. A. Head and antenna ; B. Cornicle.

green. Legs green, apices of femora and tibiæ dark ; tarsi dark. Rostrum green, apex dark, reaching to second coxæ. Antennæ longer than body ; segment i. larger than ii. ; iii. longer than iv., but shorter than vi. ; iv. about as long as v. ; vi. with basal area long, about one-third of v. Segment iii. with 11 to 15 sensoria, more or less in a line, round and rather large.

Length 2 mm.

FOOD PLANTS. Hops (*Humulus lupulinus*) ; Wild Strawberry (*Fragaria vescaria*).

LOCALITIES. Hothfield, vi. and v. 25 ; Wye, v. 25.

Observations. Numerous apteræ and larvæ were first found low down on hop leaves, and on the shoots growing in hedgerows; later they attacked the tips. The apteræ kept on breeding until July. A few alatæ were found in May and June on both Wild Strawberries and on the Wild Hops.

Genus HYALOPTEROIDES Theobald.

Theobald, Entomologist, XLIX., 51 (1916) ; Baker, Bull. 826, U.S. Dep. Agri., 56 (1920).

Body elongate, oval. Antennæ about half the length of body, of six segments; sensoria circular. Head with marked frontal tubercles and a median enlargement. Rostrum rather short. Cornicles small, cylindrical, about one-quarter length of cauda. Cauda large and bluntly acuminate. A marked space between antennæ and compound eyes.

Type species *Hyalopteroides pallida* Theobald. This genus was founded on apterous females taken in an ants' nest. To some extent it resembles *Hyalopterus*, but it has marked frontal processes which place it in the Macrosiphini and not Aphidini. Van der Goot (Tidjschrift v. Ent., lvi., 146, 1913) forms a genus *Longicaudus* for Koch's *Hyalopterus sphondylii* and Walker's *H. trirhodus*, although the cauda and cornicles agree, both those species have a typical Aphis head unlike *pallida*.

HYALOPTEROIDES PALLIDA Theobald.

Entomologist, XLIX., 51 (1916).

Apterous viviparous female. Pale green ; apices of antennæ, rostrum and tarsi dusky. Antennæ about half length of body, thin, arising from small but prominent frontal tubercles ; segment

i. large and irregular in outline; ii. small and barrel shaped; iii. longer than iv., with three to four round sensoria near base; iv. a little longer than v.; vi. about as long as iv. + v., basal area not quite half v. and much shorter than flagellum. A median projection in front of head. Eyes large, black, placed some little distance behind base of antennæ. Rostrum pale, apex dusky, not reaching to second coxæ. Cauda very large, at least four times as long as cornicles, pallid, finely spinose, 4 hairs one side, 3 the other, and a curved sub-apical one. Cornicles pale, very small, not quarter length of cauda, cylindrical, but irregular. Legs pallid, moderately long and thick; tibiæ with many pale short hairs. Tarsi smoky. Whole body elongate and narrowed.

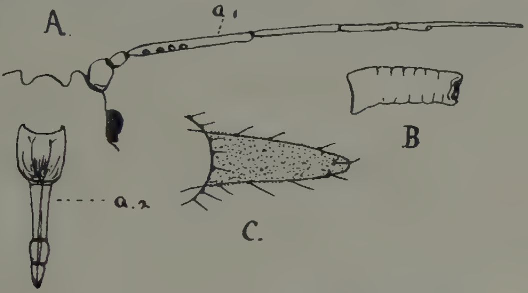

Fig. 123.—*Hyalopteroides pallida* Theobald.
A. Head and antenna; a1. Sensoria on segment 3; a2. Proboscis; B. Cornicle; C. Cauda.

Length 2.2 mm.

Localities. Porlock Weir, Somerset, 14 v. 15 (Crawley); Swordale, Evanton, Ross-shire, N.B. (D. J. Jackson).

Observations. First taken by Mr. W. C. Crawley in a nest of *Lasius niger*. The specimens found by Miss Jackson were taken on a Potato leaf; they exactly agree with the type. The most marked characters are the long, large cauda, the short somewhat corrugated cornicles and the sensoria on antennal segment iii.

Genus CAPITOPHORUS Van der Goot.

Van der Goot, Tijd. voor. Ent., 56, 84 (1913); Baker, Bull. 826, 55, Pl. VIII., A. C. (1920).

Van der Goot fixed the type of this genus—*Aphis flaveolus* or *carduinus* Walker. It approaches *Myzus*, in which some of the species have been previously placed. The marked capitate hairs and the formation of the head at once separate it from *Myzus*.

The characters of the genus are as follows: Head with not very prominent frontal tubercles, armed with marked capitate hairs; vertex with a prominent central projection with capitate hairs. Cornicles long and slender, often irregularly and slightly swollen, especially towards the distal end. Cauda rather short and more or less conical. The antennæ with circular sensoria and capitate hairs basally. Venation normal. Several well-known species occur in this genus, such as the Currant Aphid (*C. ribis*) and the Fragile Strawberry Aphid (*C. fragariæ*).

BRITISH SPECIES OF *Capitophorus*.

Capitophorus ribis Linnæus.
,, *whitei* Theobald.
,, *hippophæs* Walker.
,, *gillettei* Theobald.
,, *tetrarhodus* Walker.
,, *similis* V. d. Goot.
,, *fragariæ* Theobald.
,, *pilosus* V. d. Goot.
,, *flaveolus* Walker.
,, *avellanæ* Schrank.
,, *lamii* V. d. Goot.
,, *potentillæ* Walker.
,, *carthusianus* Haviland.
,, *rosarum* Kaltenbach.

FOOD PLANTS OF *Capitophorus*.

Artemisia maritima, etc.	C. pilosus V. d. Goot.
Carduus lanceolatus, etc.	C. flaveolus Wlk.
,, ,,	C. carthusianus Havil.
Corylus avellanæ	C. avellanæ Schr.
Elæagnus sp.	C. gillettei Theob.
Fragaria spp.	C. fragariæ Theob.
Galeopsis ladanum, etc.	C. ribis Linn.
Hippophæs rhamnoides	C. hippophæs Wlk.
,, ,,	C. gillettei Theob.
Potentilla anserina	C. potentillæ Wlk.
Polygonum spp.	C. gillettei Theob.

Ribes spp.	C. ribis Linn.
,, ,,	C. whitei Theob.
Rosa spp.	C. tetrarhodus Wlk.
,, ,,	C. rosarum Kalt.
Stachys sylvatia	C. ribis Linn.
Tussilago farfaræ, etc.	C. similis V. d. Goot.
Lamium album	C. lamii V. d. Goot.
,, ,,	C. ribis Linn
,, *purpureum*, etc.	C. lamii V. d. Goot.
,, ,,	C. ribis Linn

KEY TO BRITISH *Capitophorus*.

Alate viviparous females.

1. Cornicles slightly swollen.

A. Cornicles pale, non-reticulate.

Pale greenish-yellow to pale citron yellow; head and thorax dark. Abdomen with dark median broad bands on segments v. to vii. and 4 dark spots each side; iii. with 25 to 30 sensoria; iv. with 15 to 22; v. with 9 to 11. *ribis.*

Very similar; iii. with 40; iv. with 19 to 23; v. 3 to 7. Marked dorsal patch; darker than *ribis*. *whitei.*

Pale green to yellow, varied by yellow-green shades; abdomen with large dark median patch before cornicles and dark lateral spots. Head and most of thorax dark; iii, with 29 to 35 sensoria; iv. with 12 to 17; v. 1 to 6. *hippophæs.*

Yellow to yellow-green, dark olive-green to black marks on body; head, parts of thorax deep olive-green; iii. with 23 to 37 sensoria; iv. with 11 to 18; v. with 4 to 6. *gillettei.*

Yellow; head and thorax dark brown; iii. with 23-30 sensoria. *rosarum.*

2. Cornicles straight.

A. Cornicles imbricate.

B. Cornicles black.

Head and thorax black; abdomen green to deep green, a row of black spots on each side, now and then black bars in front, a more or less distinct dorsal patch. Cauda dusky; iii. with 48 to 54 sensoria. *tetrarhodus.*

BB. Cornicles deep olive-green.

Abdomen pale green, a large dark median area before cornicles and large dark lateral spots and dark areas basal of each cornicle. Head and thorax brown; iii. with 25 to 37 sensoria; iv. 10 to 15; v. 1 to 3. *similis.*

BBB. Cornicles pale green.

Abdomen pale yellowish-green, with a dusky patch on apical half, a few dusky spots on base and dusky lateral spots. Head and parts of thorax dark; iii. with 32 to 36 sensoria; iv. 5 to 8. *fragariæ.*

Bright yellowish; head and thorax darkened; iii. with 15 to 17 sensoria; iv. 0 to 4. Cauda rather thick; hairs almost fan shaped at apices. *pilosus.*

Pale green; head and thoracic lobes brown; iii. with 21 to 26 sensoria; iv. with 13 to 18; v., 0 to 3. *flaveolus.*

BB. Cornicles with apical reticulation.

Pale greenish-yellow. Head and parts of thorax deep brown; usually a smoky patch between cornicles; iii. with 13 to 16 sensoria. *avellanæ.*

Apterous viviparous females.

1. Cornicles slightly swollen; green.

Yellowish-green to pale green, now and then with deeper green mottlings; many capitate hairs. *ribis.*

Pale whitish-green to almost transparent white, dark green to brown spots across the segments, median pair largest; body sometimes tinged with pink and a few pale orange. Capitate hairs all over the body. *hippophæs.*

Very similar to above, but no capitate hairs on body, but on each side of mesonotum *gillettei.*

Green; a few small capitate hairs on head, none on body; median cephalic process large; antennæ short. *rosarum*

2. Cornicles straight.

A. Apices slightly reticulate.

Pale soft green tinged with dull reddish in front and sometimes at sides, very many capitate hairs. Abdomen with tufts of hairs. *avellanæ.*

AA. Cornicles non-reticulate; green.

Very pale green, often semi-transparent; head, thorax and abdomen with capitate hairs. Cauda 2 pairs of lateral hairs and a median dorso-apical one. *fragariæ.*

Green, with whitish bloom and capitate hairs; cornicles rather thick; flagellum 3 times base. *tetrarhodus.*

Pale green; cornicles thin; flagellum more than 3 times base. *potentillæ.*

Oval, flattened, pale green to almost transparent white, some with a faint yellow tinge; capitate hairs on head and apex of body. *flaveolus.*

Very pale whitish-green and translucent, some with darker green lateral spots; apical capitate hairs long. *similis.*

Segment iii. of antennæ with marked sensoria.

Yellowish-white to almost translucent white. Head and body with many capitate hairs; iii. with 2 to 3 sensoria near base; hairs on body, with nearly fan shaped apices. *pilosus.*

Green to pale yellowish-white. Head and body with many capitate hairs; iii. with 5 to 15 sensoria. Cauda thick, not quite so long as cornicles. *lamii.*

CAPITOPHORUS RIBIS Linnæus.

Aphis ribis Linnæus.
Ribifex Amyot.
Rhopalosiphum ribis Koch.
Myzus ribis Passerini.
Aphis galeopsidis Kaltenbach.
Phorodon galeopsidis Buckton.
Cryptomyzus ribis Oestlund (1922).
? *Aphis quærens* Walker.

Linnæus, Syst. Nat. Ed., 10, 451 (1758); Syst. Nat., II., 733 (1767); Fn. Suec., 977 (1789); Fabricius, Syst. Ent., 734, 5 (1775); Sp. Ins., II., 385 (1781); Mant. Ins., II., 315 (1787); Ent. Syst., IV., 211, 7 (1794); Syst. Rhyng., 295, 7 (1803); Reaumur. Ins., III., 281-350, pl. 22, figs. 7 to 10 (1738); Hausmann, Illigers Mag., I., 437, 2 (1802); Schrank, Fn. Boica, II., I, 108, 1195 (1801); Kaltenbach, Mono. Pflanz., I., 39, 26 (1843); Amyot, Ann. Soc.

Ent. Fr. Se. 2, V., 476, 520 ; Walker, Ann. Nat. Hist., Se. 2, III., 295, 61 (1850) ; Mosley, Gard. Chron., I., 628 (1841) ; Walker, List Homop. (B.M.), 69, 975 (1852) ; Koch, Die Pflanz, 39, pl. VII. (1854) ; Buckton, Mono. Brit. Aphid, I., 180-182, pl. XXXIV., figs. 1-4 (1875) ; Passerini, Gli. Afidi, 22 and 25, n.9. (1860) ; Ferrari, Ann. d. Mus. Civ. Stor. Nat. d. Genoa, II., 62 (1872) ; Theobald, Notes, Ins. Pests, 1894, 3 and 4 (1895) ; Schouteden, Mém. d. l. Soc. Ent. d. Belg., XII., 323 (1906) ; Flögel, Zeitschr. Wiss. Insekten biol., I., 49 (1905) ; Flögel, Allg. Zeitschr. f. Entom. IX., 321-333, 375-381 (1904) ; Theobald, Journ. Eco. Biol., VII., 3, 108-110, pl. III., fig. 3 (1912) ; Theobald, Insect Pests of Fruit, 219, (1909) ; Patch, Maine Agri. Exp. Sta. Bull. 225, 55-56, figs, 12, 14, 15, 33, 41 (1914) ; Van der Goot, Tidjschrift. v. Ent., LV., 72 (1912) ; Van der Goot, Beit, z. kennt. d. Hollandischen Blattlause, 113 (1915) ; Gillette and Bragg, Jour. Eco. Ent., X., 338 (1917) ; Haviland, Proc. Roy. Soc. Edin., XXXIX., 1, n. 8, 78-112,

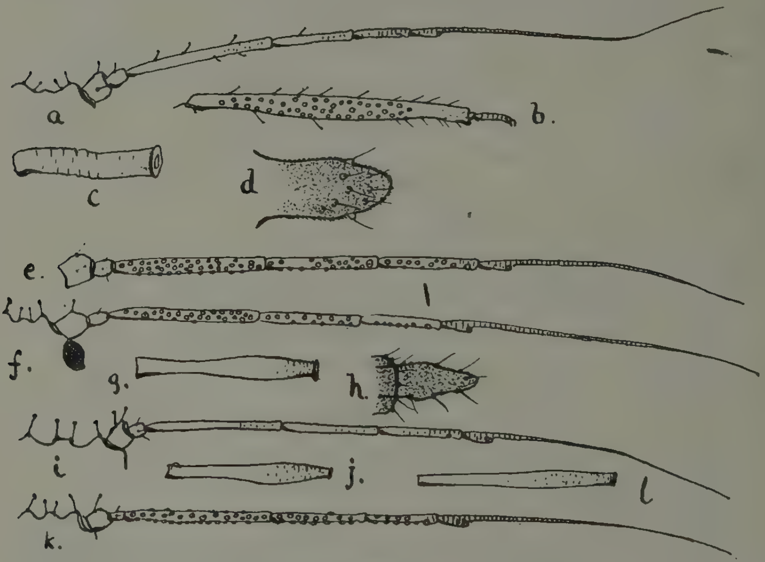

Fig. 124.—*Capitophorus ribis* Linnæus.

a. Head and antenna ; b. Hind tibia ; c. Cornicle ; d. Cauda of oviparous ♀ ; e. Antenna of ♂ ; f. Head and antenna of alate ♀ (return migrant) ; g. Cornicle ; h. Cauda ; i. Head and antenna of Apterous ♀ ; j. Cornicle ; k. Head and antenna of Alate ♀ (migrant) ; l. Cornicle of alate ♀.

figs, 1-9 (1919). Oestlund, 19th Rept. St. Ent Minnesota (1922). *Galeopsidis:* Kaltenbach, Mono. Pflanz, 35 (1843); Koch, Die Pflanz, 39, 10, figs. 50, 41 (1854); Buckton, Mono. Brit. Aphid., I., 180, pl. XXXIV., figs. 1-4 (1875).

Alate viviparous female. Pale greenish-yellow to pale almost citron yellow; head darker yellow to olive, with two dark round spots. Eyes red; hairs mostly capitate. Antennæ dark; segments i. and ii. yellowish, with capitate hairs; segments iii. to v. with sensoria; iii. with 25 to 30; iv. with 15 to 22; v. with 9 to 11, extending whole length of segments. Thorax with dark lobes, now and then a dark area on pronotum. Abdomen with dark median broad bands on segments v. to vii. and with 4 dark spots on each side; hairs capitate. Cornicles thin, swelling in some specimens to some extent apically; yellow to pallid brown, a faint stria or two at apices. Cauda yellow. Legs pale yellowish-brown; apices of femora and tibiæ dusky; tarsi dark. Wings with yellow insertions; dusky veins and stigma.
Length 1.2 to 1.8 mm.

Apterous viviparous female. Yellowish-green to pale yellow, now and then with deeper green mottlings, with capitate hairs. Eyes red. Antennæ pale yellowish-green to almost transparent, thin, longer than body; segment iii. with 5 capitate hairs one side, one the other. Cauda pale, semi-transparent yellow. Legs pale yellow, with dark tarsi; hairy; hairs capitate.
Length 1.2 to 1.8 mm.

Oviparous female. Apterous; pale yellow to almost white; hairs capitate; hind tibiæ swollen, with many sensoria not quite to apex.

Male. Alate. Antennæ long, many sensoria on segments iii. to v.

FOOD PLANTS. Red, White and Black Currants; *Galeopsis tetrahit; G. versicolor; G. bifida; Lamium album; L. purpureum; L. amplexicaule; Stachys sylvatica; Polygonum persicariæ; P. hydropiper; P. laxiflorum; P. lapathifolium.*

LOCALITIES. Widespread over the British Isles. I have found or received it from many places in Kent, Sussex, Surrey, Middlesex, Essex, Cambridgeshire, Worcester, Herefordshire, Somerset, Gloucestershire and Devon. I have also records from Great Salkeld, Penrith (Britten); Windermere (Rymer Roberts); Truro and Fowey in Cornwall (F.V.T.); Little Hadham, Herts. (F.V.T.); Criccieth and Dolgelly in North Wales (F.V.T.); two places in Guernsey (F.V.T.); Ventnor, Isle of Wight (F.V.T.); Southgate, 22 v. 47 (Walker); also common in N.E. Scotland, Hertfordshire, Hampshire, Perthshire (Laing); and 19 vi. 47 on *Lamium album* (Walker) in Nat. Hist. Mus., Ireland. It is generally common over Europe and is recorded from America (Patch, Webster, etc.).

Observations and Life-history. Apterous oviparous females and alate males may be found in October on dying Ribes leaves, often in great numbers. I have found a few as late as November 20th. The ova are deposited at the base of buds and under the loose skin on the shoots, especially on Red and White Currants. These hatch out in spring and are to be found as small, almost glass-like larvæ under the leaves, especially under the curious red blister-like patches often prominent on white and red currants, now and then on black; under these galled areas the apteræ live and breed, often in vast numbers, and may continue to do so well into July and some on into August. Now and then they continue on the Ribes right through the year. During July and even in late June most become winged and fly away from Ribes. Those that settle on *Lamium, Galeopsis, Stachys* and *Polygonum* produce living young and continue to breed on these herbs, the so-called *Aphis galeopsidis* (Kaltenbach), which was later erroneously placed in the genus *Phorodon*. In the autumn this *galeopsidis* form becomes winged and flies back to the Ribes. This return migration may take place between late September and the end of October and these females give rise to apterous oviparous females and later winged males appear and fertilise the oviparæ. The first observations made in this connection were in 1917, when Gillette and Bragg pointed out its probable migration to *Lamium* and *Stachys*; they frequently transferred migrants from *Ribes* to these herbs and the fall migrants (return migrants) to the currants. Since reading their interesting paper I have tried several times to transfer the *Ribes* alatæ to *Lamium* and have obtained the same result. Before this Van der Goot in 1915 considered it migratory and thought that his *Myzus lamii* might be the same. But in the same year Van der Goot reports fall migrants of *Phorodon galeopsidis* (he places this in *Myzus*) as coming to currants and producing oviparous females and also speaks of taking a similar Aphid on *Lamium* and *Stachys*, and made the suggestion that it may be identical with *ribis*, but thought not, as his attempts to transfer early summer forms to *Lamium* did not succeed. In 1919 Miss M. D. Haviland published a long account " On the Life-history and Bionomics of *Myzus ribis* Linn." (Proc. Roy. Soc. Edin., XXXIX., I., 8, 1919), in which the life-cycle is clearly traced and to which paper readers are referred. Börner disputes Miss Haviland's conclusions.

Koch undoubtedly describes this insect as *Rhopalosiphum ribis*. Buckton figures an alate female of *Myzus ribicola*, with black cornicles, which never occur in *ribis* and the adornment of the abdomen is very distinct. Passerini makes no mention of the capitate hairs, so that his *Myzus ribis* may not be the same. Van der Goot first made this the type of his genus *Myzus*, whereas Passerini's type for his genus was the *cerasi* of Fabricius, a totally distinct insect.

NATURAL ENEMIES. The chief enemy of this Currant Aphid is the small Braconid *Aphidius ribis* Haliday. Often whole colonies of this pest have been all killed by this parasite. On the other hand, I have seldom found in heavily infected plantations any number of either Syrphids or Coccinellidæ attacking them. In a bad attack in 1922 I hatched out a few *Syrphus ribesii* and two *Catabomba pyrastri*. Now and again the larvæ of *Adalia bipunctata* may be found feeding on them, but this is unusual. Miss Haviland records finding two Chrysopid larvæ and that individuals of all ages are persecuted by the mite, *Anystus cornigera* Koch, though there is no evidence that it causes the death of its host. On the other hand this currant pest is frequently exterminated before it migrates by a parasitic fungus *Empusa aphidis*. The writer has on several occasions seen large plantations which were crippled by this aphid completely cleared of its presence by this fungus parasite. Two notable instances occurred in Kent in 1922; unfortunately the damage had all been done before the parasite's effects were completed.

I have often noticed that insectivorous birds will not touch these currant aphids.

APHIS (CAPITOPHORUS) QUÆRENS Walker.

Zoologist, VII.; App. xlviii. (1849).

? *Capitophorus ribis* Linnæus.

"*The winged viviparous female.* While a pupa the body is elliptical and bright yellow; there is a row of green spots along the middle of the abdomen and two or three on the thorax; in the winged state the head and thorax are black; the antennæ and the tubes are of moderate length; the legs are yellow; the tarsi, the tips of the thighs and of the tibiæ are darker; the wings are colourless; the stigmata and the veins are brown."

This is evidently a *Capitophorus* and is most probably only *C. ribis*. It was described from the Red Hemp Nettle (*Galeopsis ladanum*).

CAPITOPHORUS WHITEI Theobald.

Myzus whitei Theobald.

Journ. Eco. Biol., VII., 3, 110, pl. III., figs. 6 and 12 (1912).

Alate viviparous female. Pale yellowish-green; head slightly dusky. Thorax dark brown in middle. Abdomen with large dark central patch, with 2 dark lateral spots in front. Antennæ a little longer than body, dark brown; segments iii. and iv. with sensoria all over them, about 40 on iii.; 19 to 23 on iv.; 3 to 7 on basal half of v.; iii. longer than iv., but not so long as vi.; vi. longer than v., the flagellum four times as long as basal area; hairs on segments i. to iii. capitate. Eyes dark; black to deep red. Cornicles long, thin, delicate, slightly dusky, no signs of any ornamentation, slightly swollen on apical half. Cauda pale, semi-transparent. A few capitate hairs on sides of abdomen. Legs pale yellowish, long and thin; apices of femora and tibiæ dusky; tarsi dusky; femora and tibiæ hirsute, especially the latter.

Length 2 mm.

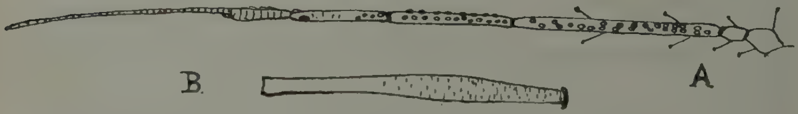

Fig. 125.—*Capitophorus whitei* Theobald.
Alate viviparous female. A. Antenna; B. Cornicle.

Localities. Paddock Wood and Wye, Kent.

Food Plants. Black Currant and Gooseberry.

Observations. Described from specimens sent me by Mr. White, of Beltring, Paddock Wood, in June, 1912, found with *A. cosmopolitanus.* Only alate females have been found. It is a small very fragile species told from *C. ribis* Linnæus by the fifth segment of the antennæ having sensoria on the basal region of the segment only and by the marked dark dorsal patch on the abdomen. It is also darker than *C. ribis.* Miss Maud Haviland considers this to be the same as *C. ribis* and also Miss Patch's, *Myzus dispar* of America. It is possible that both are varieties, but I still feel disposed to place both as two distinct species.

CAPITOPHORUS HIPPOPHÆS Walker (non Gillette).

Aphis hippophæs Walker.
Rhopalosiphum hippophæs Koch.

Walker, List Homop. (B.M.), IV., 302, 1036 (1852); Koch, Die Pflanz, 28, 3, figs. 36, 37 (1854). Takahashi, Aphid Formosa Pt. 2, 28, 83 (1923).

Apterous viviparous female. Pale whitish-green, yellowish-green to almost translucent white, with dark spots across the segments, the median pair the largest, these are dull brown to green in colour; body sometimes tinged with pink and a few may show

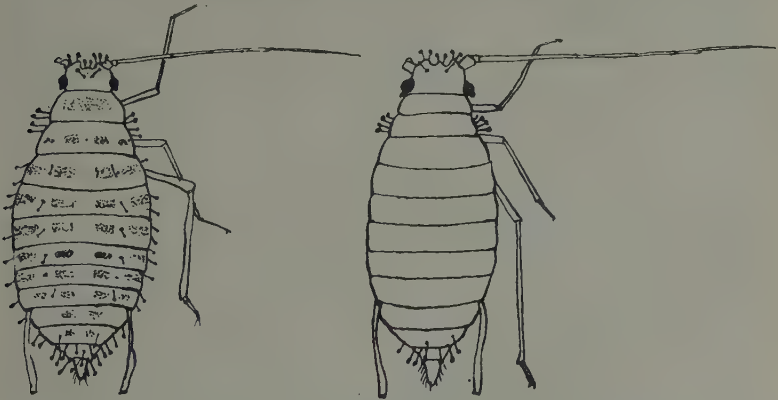

Fig. 126.

Apterous ♀ of *C. hippophæs* Walker. Apterous ♀ of *C. gillettei* Theobald.

a pale orange yellow hue; body densely clothed with fine pale upstanding capitate hairs. Antennæ, legs and cornicles pale; tarsi dusky and in some the apices of the femora and tibiæ and traces of darkening in some on the apices of the antennal segments. Antennæ shorter than body to nearly as long; segment i. large and projecting on inner side, with 3 capitate hairs, 2 large and 1 smaller; segment ii. small, with a few short, capitate hairs; iii. much shorter than cornicles and a little shorter than iv.; iv. and v. nearly equal, the latter with the usual sub-apical sensorium; vi. longer than iv. + v., its basal area about half the length of v. The hairs on antennal lobes and median cephalic process stout and capitate. Rostrum reaches to second coxæ, in some just beyond. Cornicles long, about as long as antennal segments iii. and iv., narrow, cylindrical and more or less swelling near the apex, projecting beyond the cauda. Posterior hairs thick and markedly capitate. Cauda about one-third the length of the cornicles, acuminate, broadened basally, with a few simple hairs. Body with many short stiff capitate hairs all over it. Legs moderately long, femora and tibiæ with short capitate hairs.

Length 1.7 to 2 mm.

Alate viviparous female. Pale green to yellow and varied yellow-green shades. Head and pronotum dark, also scutellum

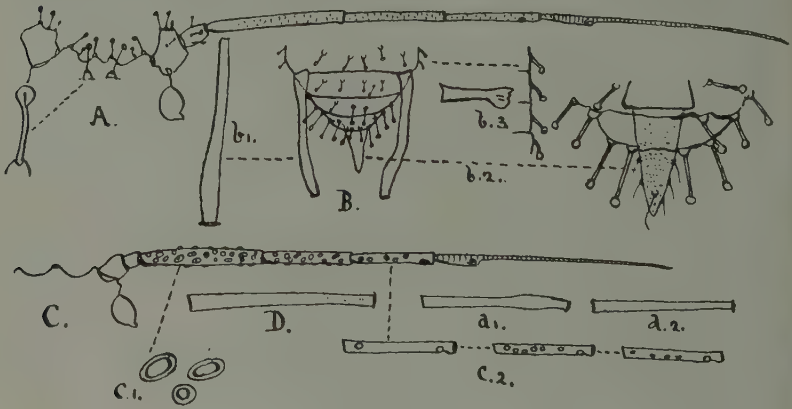

Fig. 127.—*Capitophorus hippophæs* Walker.
A. Head and antenna; B. Apex of body of Apterous female; b1. Cornicle; b2. Cauda; b3. Abdominal hairs; C. Head and antenna of Alate ♀; c1. sensoria; c2. 5th antennal segment; D. Cornicles (d1 and d2 varieties).

and thoracic lobes. Abdomen with a large dark median patch before cornicles and dark lateral spots. Cornicles and cauda pale. Antennæ dusky, paler apically. Legs pale; apices of femora and tibiæ and the tarsi dark. Antennæ as long as or slightly longer or less than half length of body; segment i. wider than ii. and somewhat projecting inwards; iii. longer than iv., not quite so long as iv. + v., slightly shorter than cornicles, with 29 to 35 sensoria over its whole length, some oval in form, others round; iv. with 12 to 17 sensoria over whole length; v. with 1 to 6, including normal primary one. Median frontal process prominent. Cornicles thin, usually cylindrical, but sometimes slightly swelling apically, about as long as antennal segment iii. to a little longer and slightly narrower. Cauda rather small. Wings normal.

Length 1.8 to 2 mm.

FOOD PLANTS. Sea Buckthorn (*Hippophæs rhamnoides*). *Polygonum lapathifolium* and *P. hydropiper* (Takahashi).

LOCALITIES. Littlestone, Kent, v., vi. and vii.; Rye, 7. v. 07; Dymchurch, 7. vi. 20 (F.V.T.); Hoylake, Lancs., vi. 12; Longmiddy, E. Lothian, N.B., 1. x. 21 (Evans); Taihoku, Formosa (Takahashi); Java (Van der Goot).

Observations. This is a common species on the Sea Buckthorn on the Kent coast, etc. It is somewhat difficult to detect at first owing to its pallid colour which camouflages it when on the leaves. The very capitate hairy nature of the larvæ and apteræ is most marked. Although I have not had opportunity of finding the sexuales, it certainly winters on the Sea Buckthorn as I have found many ova in the axils of the buds and thorns. I have always failed to find any *Capitophorus* on plants growing near the Sea Buckthorn clumps on Romney Marsh, but the alatæ leave this shrub at the end of June and do not return until the autumn. Gillette, in a paper "Confusion of *Rhopalosiphum hippophæs* Koch, and *Myzus braggii* Gillette," deals with these two species. His *R. hippophæs* Koch is certainly not that species, for the apteræ of the European *hippophæs* are exactly as Koch describes and figures, with marked capitate hairs all over the body. Gillette's apteræ as figured show no capitate hairs except between the pro- and meso-thoracic legs. Gillette's *hippophæs* Koch, is an undescribed species, which I find on *Polygonum* in England, and which I have named *C. gillettei.* There is no doubt that Walker's *Aphis hippophæs* is the same as Koch's species. Walker's description is as follows: " Flava fusciformis; thoracic discus in alatis fuscus; antennæ corpore breviores: cornicula mediocria; alis limpidæ. The *viviparous wingless female.* Pale yellow, spindle shaped, somewhat tinged with red; a few green dots on the back and a row of transverse green spots along each side of body; front bristly; feelers shorter than body; first joint angular on inner side of its tip; fourth joint much shorter than third; fifth shorter than fourth; sixth much shorter than 5th; seventh a little longer than sixth; nectaries from one-fifth to one-sixth length of the body

" *The viviparous winged female.* Disk of the chest brownish; wings colourless; distance between the first and second veins about twice farther at the tip than at the base; third very much farther from the second at the tip than at the base, very much nearer to the second at the base than the second is to the first, first fork a little nearer to the second fork than to the third vein, nearer to the third vein than the third is to the second; second fork a little nearer to the first fork than to the fourth vein; fourth vein curved near the base, straight towards the tip, nearer to tip of the rib-vein than to the second fork. Length of body ¾ line, of the wings 2 lines. England."

CAPITOPHORUS GILLETTEI sp. nov.

Rhopalosiphum hippophæs Gillette (non Koch).
Phorodon galeopsidis Davis (non Kaltenbach).
Myzus elæagni Davis (non Del Guercio).*

Gillette, Journ. Eco. Ent., VIII., 3, 375 (1915); Davis, Ann. Ent. Soc. Am. V., 1, 251 (1908); Davis, Journ. Eco. Ent., IV., 325, pl. 10 (1911).

Alate viviparous female. Yellow, pale yellow to yellowish-green. Head, thorax, antennæ and sternum dark drown to deep olive green; with dark olive green to almost black markings on the body (*vide* figure). Legs same colour as body; apices of tibiæ dark, the tarsi dark, almost black and traces of dark colour at apices of femora; cornicles pale yellowish to pale yellowish-green, dusky at apex. Cauda pale, rather long and pointed, about one-third length of cornicles. Antennæ a little longer than body. Segment i. larger than ii.; iii. a little longer than iv., with 23-37 sensoria over its whole length; iv. about as long as v., with 11 to 18 sensoria; v. with 4 to 6 sensoria (Davis says 1 to 4), in addition to the primary one. Cornicles somewhat swollen towards the apex, narrow at base. Cauda with three hairs on each side.

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* The *Siphonophora polygoni* of Thomas and Oestlund may also be the same.

Length 1.8 to 2 mm.

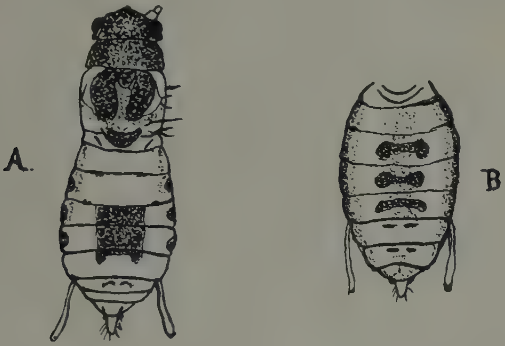

Fig. 128.—*Capitophorus gillettei* Theobald.
A. Body ornamentation of alate ♀; B. Abdomen of apterous ♀.

Apterous viviparous female. Pale yellow, often almost translucent. Head and antennæ at base with capitate hairs and a few each side of the mesonotum; legs pale yellow, apices of tibiæ and the tarsi dark. Antennæ almost white, about as long as the body. Eyes deep red. Cauda and cornicles translucent, in some almost white, others tinged with pale yellow. Antennal segment i. much longer than ii., with a short thick capitate hair; iii. longer than iv.; iv. a little longer than v.; vi. longer than iv. + v. Cauda rather long and pointed, with 3 hairs each side and 3 subapical ones.

Length 2.1 to 2.5 mm.

Male. Alate. Head and thorax dark; body pale to rich yellowish-green, with dark dorsal marks and darkened at the borders. Antennæ dark, about as long as the body. Cornicles pale, similar in form to alate female. Legs yellowish, apices of tibiæ and the tarsi dusky. Wings ample. Segment i. of

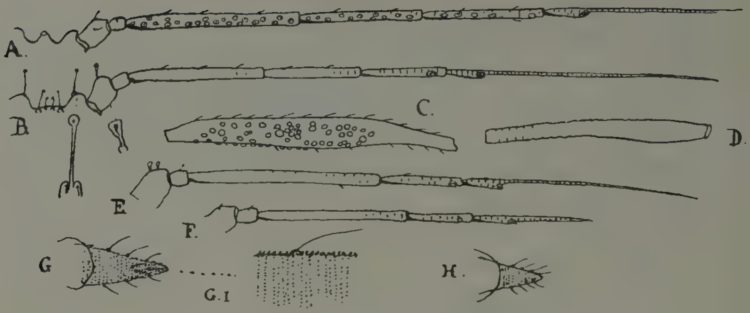

Fig. 129.—*Capitophorus gillettei* sp. nov.

A. Alate ♀ head and antenna ; B. of Apterous ♀ ; C. Tibia of ovi. ♀; D. Cornicle ; E. Oviparous ♀ antenna ; F. Stem Mother, antenna ; G. Cauda of Apt. ♀ ; G.1. Sculpture ; H. Cauda of Alate ♀.

antennæ larger than ii. ; iii. longer than iv. with 20 to 30 sensoria over its whole length ; iv. about as long as v., with 22 to 25 sensoria over its whole length ; v. with 11 to 13 sensoria over its whole length ; vi. very long, as long as iv. + v. and half iii. ; flagellum very long. Cauda small, pale green.

Length 1.3 to 1.5 mm.

FOOD PLANTS. Sea Buckthorn (*Hippophæ rhamnoides*) and *Eleagnus* (Gillette) ; *Polygonum spp.*

LOCALITIES. Wye 2 vii. 11 (F.V.T.) ; America (Gillette).

Observations. This insect was described by Gillette as the *Rhopalosiphum hippophæs* of Koch, from America. The alate female certainly agrees with Koch's species, but Koch's apterous *hippophæs* has capitate hairs all over it, and not only on the head and antennæ as shown by Gillette. He found it over wintering with another species of similar appearance, *Myzus braggii* Gillette, on *Hippophæs rhamnoides*, and the Russian Olive and in the autumn and spring and summer on *Polygonum.* Davis records it as *Phorodon galeopsidis* Kalt., from Illinois on *Polygonum pennsylvanicum.* I have found it in abundance on *Polygonum* in Kent in summer, but have never seen it on the Sea Buckthorn (*H. rhamnoides*), where Walker's and Koch's species is found in June and July.

I have compared the American specimens sent me by Gillette from *Eleagnus*, and find they agree exactly with the English specimens. It thus appears that Gillette's *hippophæs* is a new species, and I have named it after the describer. Koch's *Rhopalosiphum hippophæs* is a common species on Sea Buckthorn where this plant occurs in Britain.

CAPITOPHORUS TETRARHODUS Walker.

Aphis tetrarhoda Walker.
Myzus tetrarhoda Walker.
Siphonophora rosarum Koch and Buckton (non Kalt. and Walker).
Myzus neorosarum Theobald.

Walker, Ann. Mag. Nat. Hist., Se. 2, 42 (1849); Koch, Die Pflanz, 180, pl. XXXIII., figs. 247, 248 (1855); Theobald, Bull. Ent. Res., VI., II., 112 (1915); Blanchard, Physis. Buenos Aires, V., 20, July, p. 209, fig. 12 (1922). Theobald, Bull. Ent. Res. VI., pt. ii., 111, (1915).

Alate viviparous female. Black; the abdomen green to deep green, with a row of black spots on each side and now and then black bars and spots in front and a more or less distinct dark dorsal patch. Antennæ as long as or longer than the body, dark. Cornicles black. Cauda dusky, in some green. Legs deep green, with black apices to femora and tibiæ; tarsi black. Segment i. of antennæ larger than ii.; iii. rather thick and tuberculate, not quite twice the length of iv., with 48 to 54 sensoria; iv. a little longer than v.; base of vi. about one-half of v., in some one-third the length; flagellum rather short, about as long as v. The black cornicles are cylindrical, rather narrow, about as long as segment iv. of antennæ (Walker says as long as one-quarter of the body); imbricated. Cauda pale to dusky, about half the length of cornicles, acuminate, spinose, with several hairs. Body hairs capitate, also those of head, all rather long and plentiful. Rostrum narrow, reaching nearly to third coxæ.

Length 1.5 mm.

Apterous viviparous female. Green with a whitish bloom, with numerous capitate hairs, those on body arising from tubercles. Antennæ varying from two-thirds to nearly the length of body. Cornicles green. Cauda and anal plate green; tips of the cornicles and antennæ dusky. Eyes dark red. Segment i. larger than ii.; iii. a little longer than iv., with 5 marked capitate hairs one side and 4 to 6 on the other; iv. a little longer than iii.,

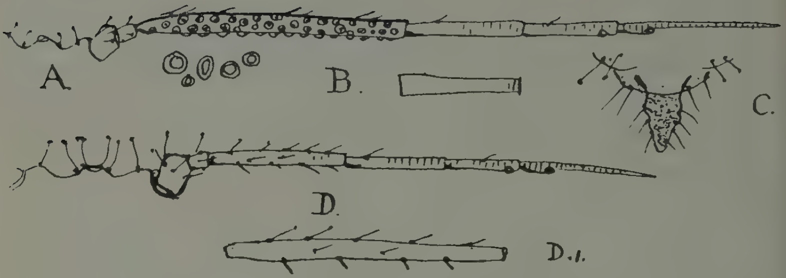

Fig. 130.—*Capitophorus tetrarhodus* Walker.
A. Head and Antenna ; B. Cornicle and C. cauda of Alate viviparous ♀ ; D. Head and antenna of Apterous ♀. D.i Segment iii. of D.

capitate hairs on each ; vi. not so long as iv. + v. ; base not quite one-fourth of iv. ; flagellum three to three and a half times length of base. Rostrum reaching to third coxæ. Head and body with long capitate hairs. The pale green cylindrical cornicles are slightly broadened basally, faintly imbricated, not quite as long as segment iii. of antennæ. The pale cauda not quite half length of cornicles, bluntly triangulate and rather narrow, spinose,—with 3 hairs each side ; often hidden under the body.

Food Plants. Roses, wild and cultivated.

Localities. Wye, viii. 11 ; Hereford, 1, viii. 17 ; Aberystwyth, iv. 24 (C. L. Walton) ; Little Hadham, Herts., viii. 1914 ; Hastings, vii. 07 (F.V.T.) ; London, Midhurst, New Forest, Pinner, Bledlow, Epping Forest, Epsom (Laing) ; Germany (Koch) ; Buenos Aires (Blanchard) ; Egypt (Theobald) ; New Zealand (Laing).

Observations. This does not seem to be a common species, but it sometimes occurs in numbers on wild roses and now and then on tea roses in gardens. The damage it does is, as a rule slight, compared with *Macrosiphum rosæ* Linnæus, but in 1925 it did a lot of harm to some Rambler Roses at Wye. The insects I referred to as *neorosarum* are only *tetrarhodus*, but with green cornicles in the alatæ and fewer sensoria on segment iii. (25-27.)

Capitophorus similis Van der Goot.
Tijdschr. v. Ent., LVI., 83 (1913).

Apterous viviparous female. Very pale whitish-green to almost white and translucent, some showing a few darker green spots laterally. Numerous capitate hairs all over head and body, most prominent apically; antennæ, cornicles, and legs semi-transparent; tarsi dusky. Eyes red to blackish-red. Antennæ a little longer than body; segment i. projecting inwards, as a blunt process at apex, much larger than ii., a few short capitate hairs; a single capitate hair on ii.; iii. about as long as to slightly longer than iv., about same length as fore femora; iv. about as long as to slightly longer than v.; iv. + v. about equal to length of cornicles; vi. rather longer than iv. + v., with long, fine, transparent flagellum. Rostrum pallid, reaching to about third coxæ. Legs moderately long, with a few fine hairs on femora and tibiæ. Cornicles long, thin, cylindrical, curved inwards, passing far beyond cauda, longer than antennal segments iii. and iv. Cauda small, pale, rather blunt; the capitate hairs of anal region passing well beyond it.

Length 1.5 to 1.9 mm.

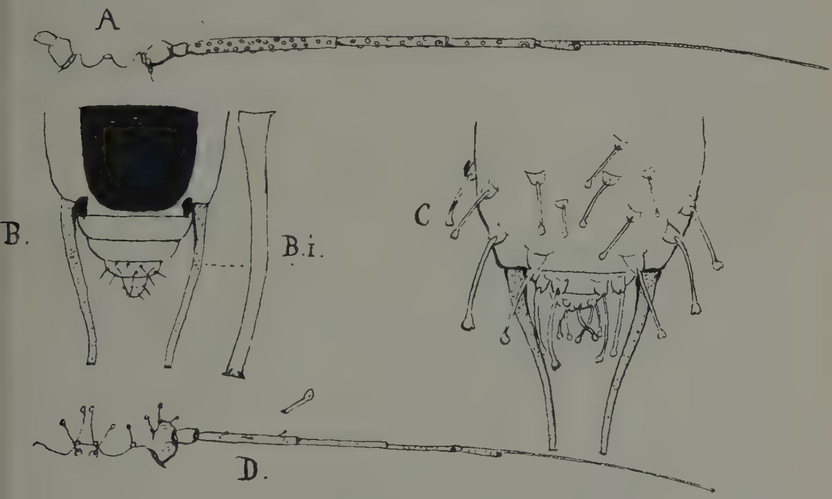

Fig. 131.—*Capitophorus similis* Van der Goot.
A. Head and antenna of alate ♀; B. Apex of body and cornicles; C. Apex of apterous ♀; D. Head and antenna of apterous ♀.
B.i. cornicle further enlarged.

Alate viviparous female. Head and thorax dark brown to pallid brown. Abdomen pale green, with a large dark median area before cornicles and large dark lateral spots and a dark area at base of each cornicle. Antennæ dark, except flagellum, which is pallid. Cornicles deep olive green. Legs pale green, apices of femora dusky, a broad dark apical band on tibiæ; tarsi dark. Antennæ longer than body; segment i. larger than ii., somewhat projecting inwards at apex; iii. as long as or a little longer than iv., with 28 to 35 sensoria over its whole length; iv. and v. about equal; iv. with 10 to 15 sensoria over whole length; v. with 1 to 3 secondary sensoria and a sub-apical one; vi. a little shorter than iii. + iv. + v.; flagellum long, pale. Rostrum acuminate, reaching to third coxæ. Cornicles cylindrical, passing beyond the cauda; curved inwards, longer than antennal segment iii. Cauda short, pallid, bluntly triangulate, with a few simple hairs.

Length 1.8 to 1.9 mm.

FOOD PLANTS. Coltsfoot (*Tussilago farfaræ* and *T. fragrans*).

LOCALITIES. Wye, ix., x. and xi., 20 (F.V.T.); Hanley Park, Staff., ix. 24 (Dallman); London, S.W., 7 ix. 24 (F. Laing); Hapton, Lancs. (Britten); Bangor, xi. 23 (Walton); Edinburgh, 2 xii. 21 (Evans).

Observations. Abundant where found under the leaves of Coltsfoot from September, right through the winter, both apteræ and alatæ occurring at Wye up to November, when most seem to be killed by parasitic fungi. It was sent me swarming on *Tussilago fragrans* in December and January from the North of England. It is a marked *Capitophorus*, having very long, thin, curved cornicles and very fragile in appearance. It bears a strong resemblance to *C. braggii* (Gillette) from America, except that the American species does not seem to have the capitate hairs all over the abdomen, as occurs in this species. It certainly does not fly to *Hippophæs* in the Wye district, for there is none about. On the other hand it is quite likely that it is the *Capitophorus* I found on *Salix* in 1907 in the late autumn; but at the same time it seems to breed on *Tussilago* all the year round.

CAPITOPHORUS FRAGARIÆ Theobald.

Myzus fragariæ Theobald.

Entomologist, XLV., 223 (1912).

Alate viviparous female. Head dark brown. Antennæ dark brown. Pronotum pale yellowish-green. Mesonotum with dark brown median area. Abdomen pale yellowish-green with a dusky patch on the apical half and a few small dusky spots on the basal segments and dusky lateral spots. Legs pale yellowish-green; apices of femora and tibiæ dusky; tarsi dark. Cornicles pale yellowish-green. Wings with smoky black veins and smoky black stigma. Hairs capitate, but rather scanty; 4 on front of head, some on the two basal antennal segments and short ones on the body, the heads being slightly swollen. Antennal segment iii. with 32 to 36 sensoria disposed all along it; iv. with 5 to 8 sensoria; iii. about as long as iv. + v.; vi. a little longer than iv. and v. Cornicles show faint imbrication, not projecting beyond pale green cauda, which has two pairs of lateral hairs and one median sub-apical one.

Length 2 to 2.5 mm.

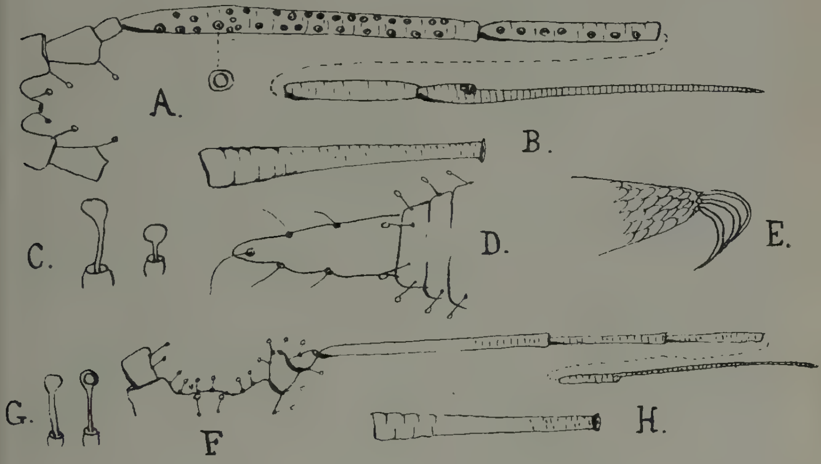

Fig. 132.—*Capitophorus fragariæ* Theobald.
A of E. Alate ♀; F-H. Apterous ♀. A. Head and Antenna; B. Cornicle; C. enlarged hairs; D. Cauda; E. wing clasp; F. Head and antenna of apterous ♀. G. enlarged hairs; H. Cornicle.

Apterous viviparous female. Very pale green, often semi-transparent. Head, thorax and abdomen with capitate hairs. Antennæ as long as body; segment i. rather large, with a thick blunt swelling on inner side; ii. small; iii. long, not quite so long as iv. + v., which are equal; vi. longer than iv. + v.; i. with several, ii. with two large and some quite small capitate hairs; iii. with one or two on the inside. Cornicles long and thin, almost transparent, with faint imbrication; projecting some distance beyond the cauda. Cauda pallid green, with two pairs of lateral hairs and a median sub-apical one. Legs pallid green, almost transparent; tarsi slightly dusky; femora and tibiæ with capitate hairs. Eyes blackish.

Length 1 to 1.5 mm.

FOOD PLANT. Cultivated Strawberries.

LOCALITIES. Hounslow, Middlesex; Swanley, Kent; Rudgewick, Sussex (F.V.T.); Aberystwyth, North Wales, iii. 24 (C. L. Walton); Long Ashton, Bristol (L. N. Staniland); Bartley, Hants.; Birmingham (F. Laing).

Observations. Described from a colony sent me by the Board of Agriculture in March, 1912, from glasshouses at Hounslow. At first the apterous females occurred only under the leaves; later they and the nymphæ swarmed up the leaf stalks. Nymphæ first occurred on March 29th, many on April 4th, and alate females on April 10th. The apterous females resemble *Capitophorus ribis* but are a more transparent and more green. The alate females are very distinct, having green cornicles and quite different abdominal ornamentation. Some alate females appear to have five, some three curved hairs on the papillæ on the under wings. I also found this Aphid swarming on hothouse strawberries in May at Rudgwick, and according to Admiral Goodridge, doing much harm. A succession of alatæ kept on appearing from then until mid-June.

CAPITOPHORUS PILOSUS Van der Goot.

Myzus pilosus Van der Goot.

Tijds. v. Entomo., LV., 68 (1912).

Apterous viviparous female. Yellowish-white to almost transparent white. Eyes deep red. Antennæ whitish, apices darkened and some show dusky bands at apices of segments iv. and v. Legs whitish; tarsi dark. Cornicles and cauda pale yellowish-white to transparent white. More or less oval in form. Body and head with numerous capitate hairs. Antennæ longer than body. Segment i. much larger than ii.; iii. longer than iv., not quite so long as vi. with 2 to 3 sensoria near base; iv. slightly longer than v.; basal area of vi. rather less than one-quarter of v.; flagellum long. Rostrum reaches to about second coxæ; apical segment very acuminate and narrow; penultimate broad. Cornicles narrow, cylindrical, somewhat bulging at base, faintly imbricate. Cauda less than one-third cornicles, broad and bluntly acuminate, 2 hairs each side and 1 sub-median. Legs with numerous thin hairs on tibiæ. Body hairs in some cases almost fan-shaped at apices, with fine radiating striæ.

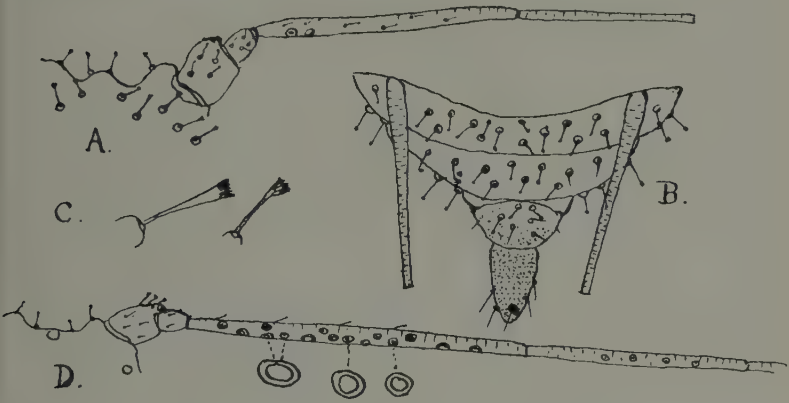

Fig. 133.—*Capitophorus pilosus* V. d. Goot.
A. Head and base of antenna; B. Apex of body; C. Hairs of apterous ♀; D. Head and antenna of alate ♀.

Length 1.7 to 2 mm.

Alate viviparous female. Bright yellowish; head and thorax darkened. Antennæ longer than body; segment i. larger than ii.; iii. considerably longer than iv., not so long as vi., with 15 to 17 round sensoria; iv. a little longer than v., with 0 to 4 round sensoria; v. with usual sub-apical one; vi. with basal area about one-third of v.; flagellum long. Cornicles thin, cylindrical, slightly bulging basally, much shorter than antennal segment iii. Cauda thick and bluntly pointed, about one-third of cornicles. Rostrum reaches nearly or quite to second coxæ. Legs rather long and thin; numerous short hairs on tibiæ. Cephalic hairs and most of those on body capitate.

Length 1.9 to 2 mm.

Food Plants. *Artemisia vulgaris* and *A. maritima.*

LOCALITIES. Sandwich, 25 viii. 22 (F.V.T.); Holland (Van d. Goot).

Observations. I found this insect swarming on both species of *Artemisia* at Sandwich near the coast, but all were apterous females, though two that I brought home became alate. I made only a few colour notes, so append the original description. It is a very marked species, the cornicles bulging at the base is characteristic and also the marked capitate hairs, with almost fan-like striated apices. The insects occurred all over the leaves and amongst the blossom heads.

Van der Goot's description is as follows:

"Korper hell gelblich leider habe ich versäumt weitere Notizen über die Farbe des geflügelten Tierchens zu machen). Kopf und Thorax, namentlich aber das Abdomen mit vielen kurzen stachelähnlichen, etwas geknöpften Härchen dicht besetzt. Fühler viel länger als der Körper; Längenverhältniss der letzten apleider etwa wie 30. 25. 25. 8. 55. Diese Glieder tragen alle rundliche Riechplatten und zwar meist; iii. 15; iv. 4; v. 1; vi. 1 (+ 4). Die primären Riechplatten haben einen feinen Haarkranz. Rüssel bis zum 2^{t} Coxenpaare reichend. Siphunculi, Cauda etc üngefähr wie beim ungeflügelten Weibchen gestaltet. Flügel mit normalem Geäder. Hafthaken 3."

CAPITOPHORUS NEOROSARUM Theobald.*

Myzus neorosarum Theobald.

Theobald, Bull. Ent. Res., VI., pl. II., 111 (1915).

Alate viviparous female. Green and non-hirsute. Head deep olive green. Thorax deep olive-green, with black thoracic lobes. Antennæ dark, longer than body. The green abdomen has black transverse bars and 4 spots each side. Cornicles green, cylindrical, long, some showing dusky apices. Cauda green, about half as long as cornicles and broader. Eyes garnet red. Rostrum green, reaching second coxæ; apex dusky. Legs green; apices of tibiæ and tarsi dark. Wings large; insertions yellowish; stigma and veins grey. Segment i. of antennæ larger than ii.; iii. much longer than iv., about as long as vi., with 25 to 27

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* On recently examining the slides I feel almost certain that this is only a variety of *tetrarhodus*, differing from the latter only in the fewer sensoria on segment iii of the alate ♀ antenna and its green cornicles.

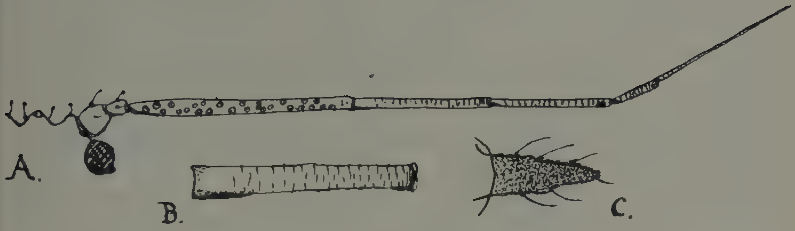

Fig. 134.—*Capitophorus neorosarum* Theobald.
Alate ♀. A. Head and antenna ; B. Cornicle ; C. Cauda.

sensoria over whole length, mainly on one side ; iv. longer than v. ; basal area of vi. about one-third of v. ; flagellum moderately long. Median cephalic frontal process large, lateral processes prominent. Cauda with 3 long hairs each side. Cornicles faintly imbricated and with faint striæ at apices. Frontal hairs capitate.

Length 1.4 to 1.7 mm.

Apterous viviparous female. Green, long, oval, flat. Hairs on head rather long and capitate. Antennæ green, apices dusky,

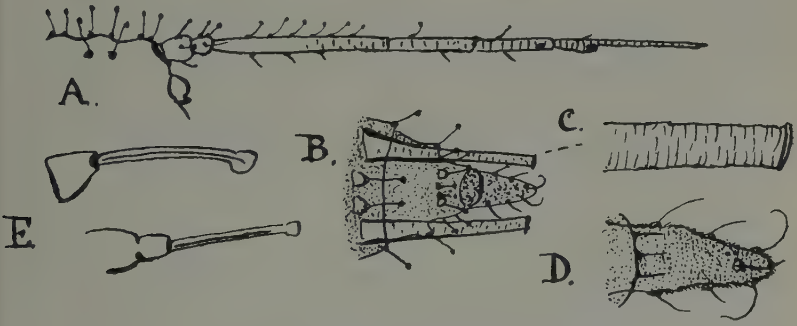

Fig. 135.—*Capitophorus neorosarum* Theobald.
A. Head and antenna of apterous ♀ ; B. Cornicles and cauda ; C. further enlarged apex of cornicle ; D. Cauda ; E. enlarged hairs.

about two-thirds length of body ; hairs capitate. Cauda green. Cornicles green, cylindrical, rather long, imbricate. Body hairs capitate, numerous, especially on apex.

Length 1.5 to 1.9 mm.

FOOD PLANTS. Wild and cultivated Roses.

LOCALITIES. Wye; Oxford; Ventnor (F.V.T.).

Observations. A rare Aphid on both wild and cultivated roses. It causes but little injury to the latter. Closely resembles *Capitophorus tetrarhodus*, but can at once be told by (1) the green cylindrical cornicles; (2) the green cauda; and (3) by the fewer sensoria on iii. in the alate ♀.

CAPITOPHORUS FLAVEOLUS Walker.

Aphis flaveola Walker.
Aphis carduina Walker.
Phorodon carduinum Schouteden.

Walker, Zoologist, VII., lv. (1849); Walker, Ann. Mag. Nat. Hist., VI., Se. 2, 44, 89 (1850); Schouteden, Mém. d. l. Soc. Ent. Belg., XII., 234 (1906); V. d. Goot, Tijd. v. Ent., 56, 84 (1913).

Apterous viviparous female. Body oval, flattened; pallid green to almost transparent white, some with a faint yellow tinge, capitate hairs on head and apex of body; antennæ same colour as body, apices of segments iii. to v. sometimes dusky; vi. also dusky; longer than body; rostrum, cornicles and cauda same colour as body, apex of first dark; eyes black; legs same colour as body, apices of femora and tibiæ dusky; tarsi dusky. Segment i. of antennæ much larger than ii., both angulated; iii. larger than iv.; iv. and v. about equal; vi. with basal area not half v.; flagellum about four times length of base. Rostrum reaching to or past third coxæ. Capitate hairs of head long. Cornicles long, thin, cylindrical, projecting well beyond the body and about one-fourth length of body. Cauda about one-fourth length of cornicles, broader, spinose, with a few hairs. A few capitate hairs on body, which are longer and prominent at apex.

Length 1 to 1.5 mm.

Alate viviparous female. Pale green, thoracic lobes brown. Antennæ longer than body; segment i. much longer than ii., angulated; iii. a little longer than iv., with 21 to 26 round sensoria over whole length; iv. and v. about equal; iv. with 13 to 18 sensoria; v. with 0 to 3 + the normal sub-apical one; basal area of vi. rather more than one-third of v.; flagellum not so long as iv. + v. Rostrum reaches nearly to the third coxæ. Cornicles, long, thin, cylindrical, a little longer than antennal segment iii., projecting well beyond body. Cauda about one-third length of cornicles, spinose, two hairs each side.

Length 1 to 1.3 mm.

FOOD PLANTS. Thistles (*Carduus sp.*).

LOCALITIES. Sandwich, 19 viii. 22 (F.V.T.); Edmonton, vi. 47 (Walker). On the Downs above Midhurst, 1915; Shoreham Kent, 1919; Wendover, Bucks., 1920, all apteræ. (F. Laing).

Observations. I have only found this species once, although I have searched thousands of Thistles. Those I found at Sandwich swarmed on the Thistle heads mixed up with and usually hidden by *Anuraphis cardui.* The alate female I have redescribed from a specimen of Walker's in the National Museum of Ireland (Dublin). Walker stated that the alatæ occur from June to November, the apteræ in November. From the description it seems to me that his *flaveola* is the same as his *carduina* and is very possibly the oviparous female. Walker's descriptions are here appended:

" *Flaveola* on Thistle (Carduus).

" *Apterous viviparous female.** The body is elliptical, bright pale yellow; the limbs are pale yellow; the antennæ are black towards the tips and a little shorter than the body; the eyes and the top of the rostrum are pale yellow; the tubes have black tips and are as long as one-quarter of the body; the tarsi and the tops of the tibiæ are black. In the beginning of November."

Carduina.

" *The viviparous wingless female.* The body is rather small, oval, somewhat flat, pale green; front narrow and rather bristly and has a tubercle on each side; the feelers are yellow and much longer than the body; the tips of the joints are black; 1st and 2nd joints angular; 4th much shorter than 3rd; 5th as long as the 4th; 6th not half the length of the 5th; 7th about four times the length of the 6th; the mouth pale yellow; its tip and the eyes black; the tube at the end of the abdomen is short; nectaries pale green, with black tips and nearly one-quarter the length of the body; legs long and pale yellow; knees, feet and tips of shanks black. In the beginning of November.

* This is probably the oviparous ♀.

" *Viviparous winged female.* Like the wingless insect in colour, but somewhat darker about the chest; wings colourless and much longer than the body; second vein diverges from the 1st, but is nearly parallel to the 3rd, the 2nd fork of the latter begins a little after one-third of the length of the vein and its lower branch converges slightly towards the 2nd vein; the 2nd fork is beyond two-thirds of its length; the 4th vein is curved moderately and equally throughout its length and the angle of the branch whence it springs is very slight. Length of body ½ line; of wings 1½ line. Found on the Thistle. June to November."

CAPITOPHORUS AVELLANÆ Schrank.

Aphis avellanæ Schrank.
Aphis coryli Mosley.
Siphonophora avellanæ Koch.
Macrosiphum avellanæ Theobald, etc.

Schrank, Fn. Boica, II., 112, 21, 1207 (1801); Kaltenbach, Mono. Pflanz., 143 (1843); Koch, Die Pflanz, 168, figs. 230, 231 (1855); Walker, Ann. Mag. Nat. Hist. Se. 2, II., 302, 64 (1848); Mosley, Gard. Chron., I., 628 (1841); Buckton, Mono. Brit. Aph., I., 149, pl. XXII. (1875); Theobald, Journ. Eco. Biol., VIII., 119, fig. 34 (1913).

Alate viviparous female. Pale greenish-yellow. Head, a band on pronotum, thoracic lobes and scutellum dark brown. Antennæ longer than body; two basal segments deep brown, other segments very pale brown to yellowish. Eyes red. Cornicles pale green, between them is often a smoky patch on the abdomen; the apices with a few reticulations. Legs pale yellowish-brown; femora and tibiæ darkened at apices; tarsi dusky; hairy.

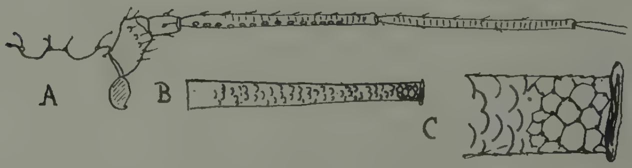

Fig. 136.—*Capitophorus avellanæ* Schrank.
A. Head and Antenna of alate female; B. Cornicle; C. Apex of cornicle further enlarged.

Wings with yellowish insertions; stigma brown. In some the cornicles are dark at the tips and the legs pale brown. Segment i. of antennæ much larger than ii.; iii. a little longer than iv., with 13 to 16 sensoria in a line.

Length 1.7 to 2 mm.

Apterous viviparous female. Pale soft green, tinged with dull reddish in front and sometimes at the sides; some specimens are all pale green, semi-transparent; very hairy; hairs capitate. Antennæ brown, as long as the body, arising from prominent frontal tubercles, but porrect, not as in *Macrosiphum.* Head very broad. Eyes red. Abdomen tuberculate; tufts of capitate hairs arising from tubercles. Cornicles long, thin, pale green. Cauda pale green. Legs pale brown, apices of femora and tibiæ darkened; tarsi dark. Antennæ, legs and vertex with hairs.

Length 1.5 to 2 mm.

The immature forms are pale green.

FOOD PLANTS. Hazel (*Corylus avellanæ*) and on cultivated Cob and Filbert nuts.

LOCALITIES. General over England and Wales and N.E. Scotland, common during some years (Laing).

Observations. Very abundant in some years, especially in the Kent nut plantations. It swarms over the leaf stalks and shoots, and now and then does some harm, but it is seldom that spraying has to be resorted to. Some years it is quite scarce. It is first noticed in May and alate viviparous females occur from June to the end of August.

CAPTIOPHORUS LAMII Van der Goot.

Myzus lamii Van der Goot.
Phorodon galeopsidis Kalt exparte ?

Tidjs. v. Ent., LV., 69 (1912).

Apterous viviparous female. Green to pale yellowish-white. Eyes red. Antennæ pallid. Legs, cornicles and cauda same colour as body. Head and body with many capitate hairs. Antennæ longer than body; segment i. much larger than ii., both angulated; iii. nearly twice as long as iv.; iv. and v. equal; iii. with 5 to 15 round sensoria near the base; iii. with 5 outstanding capitate hairs on one side, 3 the other, arising from

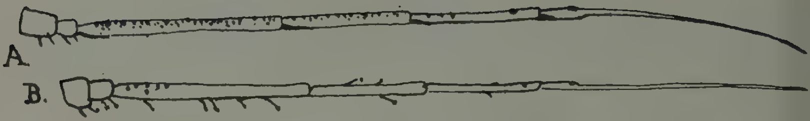

Fig. 137.—*Myzus lamii* V.d.Goot.
Antenna of Alate ♀ A and Apterous ♀ B (after V.d.Goot.)

small processes ; iv. with 3 finely capitate hairs ; v. with 3 one side and 2 the other ; base of vi. about one-seventh of the flagellum ; long capitate hairs on i. and ii. Cephalic hairs markedly capitate, moderately long. Rostrum rather thick and short, reaching to or just past second coxæ. Cornicles narrow, cylindrical, rather short, not projecting beyond the body, about half the length of antennal segment v. Cauda thick, not quite so long as the cornicles, bluntly acuminate, markedly spinose and with a few long hairs. Legs rather long, hairy, hairs one side of femora and tibiæ capitate. In some the cornicles are slightly swollen. The capitate hairs on body in transverse rows.

Length 2.5 to 2.7 mm.

Alate viviparous female. " Kopf und Mesothoracal-Lappen braun ; Abdomen gelb mit auf dem hinteren Teile ein unregel mässiger schwarzer Rücken-flecken oder einige schwarze Querbinden. Augen rot. Fühler schwarz. Beine weisslich, Tars, Schienenspitze und Schenkelspitze schwarz. Siphunculi und Cauda gelb. Körper mit Querreihen kurzer Härchen auf dem Hinterleibe ; diese Härchen sind an der Spitze abgestutzt. Fühler länger als der Körper, Längenverhaltniss der 5 letzten Glieder etwa wie 58. 40. 37. 9. 90. Riechplatten finden wir auf Glied iii. bis vi. und zwar meist iii. 50 ; iv. 25 to 30 ; v. 3 to 4 ; vi. 1 (+6). Primäre Riechplatten mit undeutlichem Haarkranz Stirnknöpfe ziemlich gut ausgebildet. Rüssel bis zum 2 Coxæ paare reichend. Siphunculi, Cauda, etc., ungefähr wei beim ungeflügelten Weibchen gestaltet."

Length 2.6 mm.

FOOD PLANTS. Red and White Dead Nettles (*Lamium purpureum* and *L. album*).

LOCALITIES. Wye, 10 iv. 20 (F.V.T.) ; Charmouth, Dorset, 1923 (Laing) ; Holland (V. d. Goot).

Observations. I have only found this very marked *Capitophorus* once and then only apteræ in great numbers. It can at once be told from all other species of *Capitophorus* that I know by the shorter cornicles and by the sensoria on the base of antennal segment iii. in the apteræ. The description of the alate female is given from the original description.

CAPITOPHORUS POTENTILLÆ Walker.*

Aphis potentillæ Walker.
Macrosiphum potentillæ Theobald.

Walker, Ann. Mag. Nat. Hist., VI., Sc. 2, 122 (1850); Theobald, Journ. Eco. Biol., VIII., 150 (1913).

Oviparous female. Apterous; yellow, except last segment of antennæ and the tarsi which are dusky. Eyes red. Marked large capitate hairs on head, end of body and smaller ones on the antennæ, legs and body. Antennæ a little shorter than body, of six segments; basal one larger than ii., with several capitate hairs; ii. with median band of similar hairs; iii. longer than iv.; iv. longer than v.; iii. with several capitate hairs; others with simple hairs. Cornicles narrow and cylindrical, about as long as and as thick as antennal segment iii., expanded at base, imbricated,

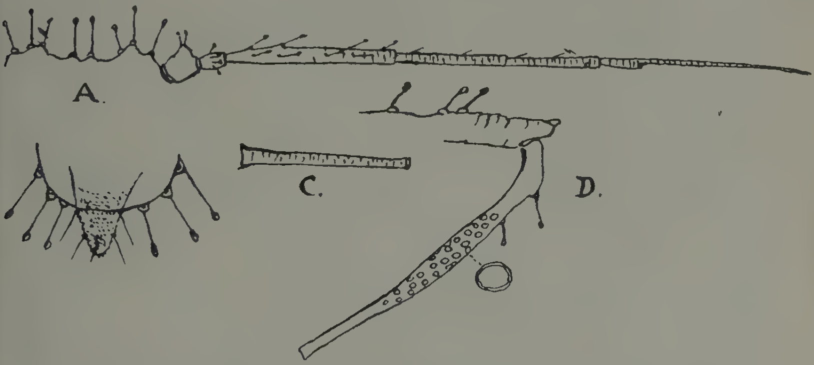

Fig. 138.—*Capitophorus potentillæ* Walker.
Oviparous ♀. A. Head and antenna; B. Cauda and anal plate; C. Cornicle; D. Apex of hind femora, and tibia.

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* I have recently found a slide of apterous viviparous ♀♀. They much resemble *tetrarhodus*, so much so that I am inclined to think it is that species.

reaching slightly beyond the cauda. Cauda rather short and broad, more or less triangulate, 2 hairs each side and 1 sub-apical. Rostrum rather broad, reaching to third coxæ; dusky at apex. Legs rather broad; hairs capitate, those on apices of femora outstanding; apices of hind femora projecting on one side; hind tibiæ not very much broadened, with numerous very narrowly contoured sensoria in mid region.

Length 1 to 1.3 mm.

FOOD PLANT. *Potentilla anserina.*

LOCALITIES. Wye, 18 x. 13.

Observations. I have only once found the oviporous females of this insect.

CAPITOPHORUS CARTHUSIANUS Haviland.

Myzus carthusianus Haviland.

Entomologist LI., 658, 49 (1918).

"*Apterous viviparous female.* Oval. Length 1.10 mm. Breadth of abdomen 0.60 mm. Whole body studded dorsally with clavate hairs, which are also scattered though more sparsely, over the legs and two proximal joints of the antennæ. Two tubercles on the frontal margin, each bearing a similar, but rather longer and stouter hair. Eyes bright red. Total length of antennæ 1.20 mm., that of sixth joint alone 0.50 mm. Third, fourth and fifth joints slightly imbricated; sixth joint ringed, very long and slender. All these joints blackish. Rostrum black, extending just beyond second coxæ. Cornicles cylindrical, curved and somewhat expanded at the orifices. Distal third blackish. Length 0.40 mm. Cauda obtuse, bearing two pairs of long clavate hairs. Legs medium, fairly stout, furnished with a few long stiff hairs. Femoral and tibial joints black."

FOOD PLANT. Thistle (*Carduus sp.*).

LOCALITY. Charterhouse, Surrey (Haviland).

Observations. Described by Miss M. D. Haviland from a single specimen taken in autumn, 1916, with numerous *Pemphigus bursarius* on the roots of the host plant. The specimen was preserved in spirit, so that the actual colour is unknown, but Miss Haviland thinks it was pale green or yellow. The specimen appears to me to be an immature form, and the legs in the figure are certainly abnormal. It might possibly be a subterranean race of Walker's *flaveolus*.

CAPITOPHORUS ROSARUM Kaltenbach.

Aphis rosarum Kaltenbach.
Myzus rosarum Schouteden.
Myzaphis rosarum V. d. Goot.
Francoa elegans Del Guercio.

Kaltenbach, Mono. Pflanz., 101 (1843); Walker, Ann. Mag. Nat. Hist., Se. 2., III., 302, 64 ï(1849); Schouteden, Mém. Soc. Ent. Belg., XII., 233 (1906); Van der Goot, Tijds. v. Ent., 56 (1913); Theobald, Bull. Ent. Res., VI., 4, 112 (1915); Del Guercio, Redia, 12, 201 (1917).

Alate viviparous female. Head and thorax deep olive green; thoracic lobes dark brown to black; abdomen green with dark lateral spots and darker markings posteriorly. Antennæ deep olive green, not quite so long as body; cauda and cornicles deep olive green to deep brown. Legs olive green, femora darkened except at base; apices of tibiæ and the tarsi dark. Eyes deep red. Wings large; insertions yellow; veins and stigma greenish-brown. Segment i. of antennæ larger than ii.; iii. not quite twice as long as iv., longer than vi., with 28 to 32 sensoria of unequal size over its whole length; iv. much longer than v.; vi. with basal area a little shorter than v.; flagellum short, about as long as v. Head with prominent median process, with ocellus at apex and small but prominent lateral processes. Proboscis not reaching second coxæ. Cornicles dark, thin, cylindrical, slightly swelling on apical half and a little longer than antennal segment iv. Cauda large, acuminate, wide at base, about two-thirds length of cornicles, spinose, 3 hairs each side. Anal plate dark, with a few hairs, somewhat acuminate. Many hairs on tibiæ.

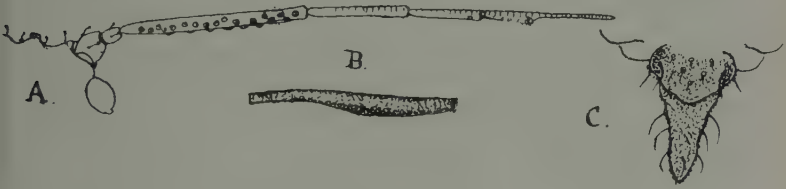

Fig. 139.—*Capitophorus rosarum.* Kaltenbach.
Alate viviparous female. A. Head and antenna. B. Cornicle. C. Cauda.

Length 2 to 2.6 mm.

Apterous viviparous female. Green, except for dark tarsi and slight darkening of apices of cornicles. Eyes red. Antennæ about one-third length of body; segment i. larger than ii.; iii. longest; iv. a little longer than v.; vi. with basal area a little shorter than v.; flagellum short, about as long as iv. Head with prominent median process and smaller lateral ones; hairs short and capitate, also a few capitate hairs on basal segments of antennæ. Cornicles long, cylindrical, slightly swelling on apical half, longer and thicker than antennal segment iii. Cauda long, more than half length of cornicles, thick, acuminate, 3 hairs each side. Anal plate somewhat acuminate. Rostrum dusky at apex, reaching to second coxæ. Legs moderately long and thick, with a few stiff hairs on tibiæ.

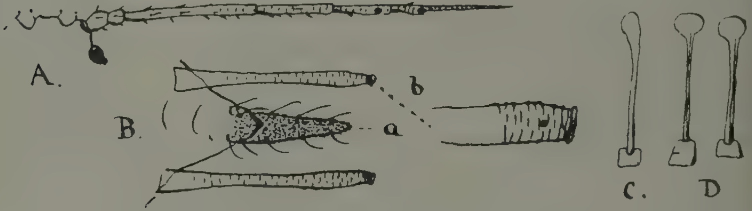

Fig. 140.—*Capitophorus rosarum.* Kaltenbach.
Apt. ♀. A. Head and antenna; B. Cornicles (b) and Cauda (a); C. Hair of *rosarum.* Kalt; D. Hairs of *C. neorosarum* Theobald.

Length 1.7 to 2 mm.

FOOD PLANTS. Wild and cultivated Roses.

LOCALITIES. Wye, 15 v. 10; 20 vii. 11; 17 vi. 18; Panton Lincs., 14 viii. 13; Stowting, Kent, 27 v. 13 (F.V.T.); Porlock, 17 v. 15 (Crawley); Penhoe, Holyhead, 1 vi. 23; Anglesey, 15 iii. 23; Langwyton, Denbigh, 15 vi. 24; Aber, North Wales, 5 v. 23 (C. L. Walton); Epsom; Dorking; common some years in the Chilterns (Laing).

Observations. A fairly common species on cultivated roses and to some extent on wild roses. It looks very like *Capitophorus tetrarhodus* Walker, but can at once be told by the short scanty cephalic capitate hairs and by the long cauda. The median cephalic process is very marked and the antennæ short. Van der Goot made it the type of his genus *Myzaphis*. Del Guercio's

Francoa elegans is certainly this species. It usually occurs in clusters under the leaves in May on the young shoots and may cause considerable damage, especially to Rambler Roses.

Genus TRILOBAPHIS Theobald.

Ent. Mo. Mag., 3rd Se., VIII., 137 (1922).

Head with three large lobes in front; the median one almost globular and slightly dorsal. Antennæ very short, not more than half the length of the thorax; of six segments; basal segment large and with an inwardly projecting blunt process. Proboscis short and thick. Cornicles long, thick, cylindrical, constricted at apex, slightly swollen on the inner side towards the apex, with marked imbrication; about two-thirds the length of the antennæ. Cauda small, but prominent, about one-quarter length of cornicles, and about the same width to slightly narrower. Anal plate bluntly triangulate. Legs short; the hind pair not projecting beyond apex of body. Eyes large, with prominent ocular process.

Type in writer's collection. The apterous viviparous female stage only is known and is very marked owing to the peculiar structure of the head and the markedly large cornicles.

TRILOBAPHIS CARICIS Theobald.

Ent. Mo. Mag., 3rd Se., VIII., 138 (1922).

Apterous viviparous female. Green to dull yellowish-green. Eyes deep red, large. Apex of antennæ slightly dusky, also the tarsi and apices of the tibiæ. Elongated oval. Head with three

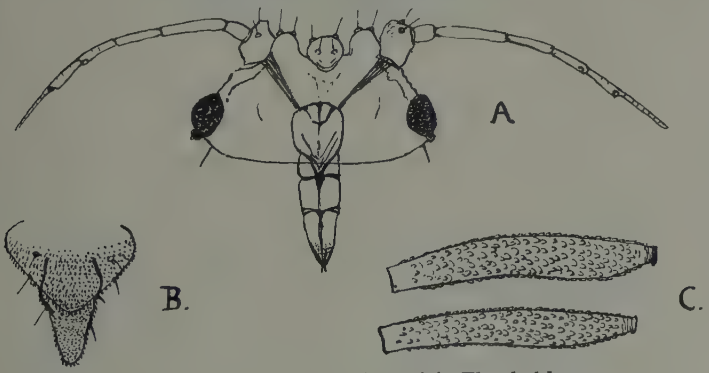

Fig. 141.—*Trilobaphis caricis* Theobald.
A. Head of apterous viviparous ♀; B. Cauda and anal plate; C. Cornicles.

large frontal processes; median one more or less globular, lateral ones with two hairs each, arising from marked mammillæ; median with four hairs. The short antennæ do not reach the second pair of legs; of six segments; segment i. much larger than ii., with a blunt apical projection on the inner side, with 2 hairs; segment iii. longer than iv., not quite so long as vi.; iv. and v. about equal, the latter with a round sub-apical sensorium; vi. with basal area about as long as v., the flagellum a little longer than base; a few faint imbrications on vi. Rostrum very short, reaching midway between the first and second coxæ; apex black. Thoracic segments distinct. Cornicles thick, cylindrical, more than half the length of the antennæ, constricted at apex and in some slightly swelling towards the apex on the inner side, with marked imbrications and crenulation on the edges. Cauda prominent; about one-quarter the length and scarcely as wide to as wide as the cornicles, finely spinose with 2 hairs one side, 1 the other. Anal plate bluntly triangulate, spinose, with a few hairs. Legs short; the hind pair not reaching to the end of the body. Tibiæ and apices of the femora with fine hairs. The thick cornicles slope inwards and only just project beyond the tip of the cauda.

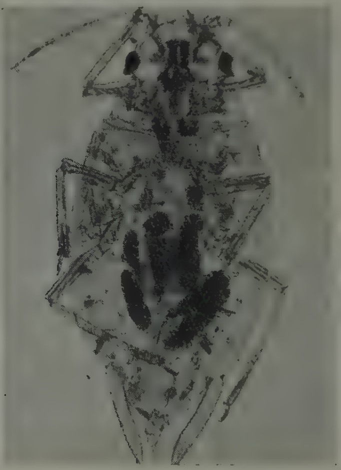

Fig. 142.—*Trilobaphis caricis* Theobald.
Apterous viviparous ♀. (× 38).

Length 1.5 to 2.0 mm.

FOOD PLANT. *Carex remota.*

LOCALITY. Banks of the Ogwen River, near Bangor, North Wales (C. L. Walton).

Observations. Described from a number of apterous viviparous females sent me by Mr. Walton, with colour notes. It is a very strange Aphid and comes somewhere in the *Macrosiphini.* Mr. Walton has searched for it again to find the alatæ, but has not been successful.

Genus JACKSONIA Theobald.

Scottish Naturalist, 9, 10, 1 fig., Jan.-Feb., 1923.

Head with large frontal processes, which project slightly inwards, much corrugated as in *Myzus.* Antennæ of six segments, not quite half the length of body. Eyes large, with ocular process of abnormal form. Cornicles moderately long, cylindrical, not quite so long as antennal segment iii., apex not flat, but markedly sloping, with no flared lips. Cauda small, usually scarcely projecting beyond the body, slightly constricted near base. Skin with dense small papillæ, possibly really corrugations. Apteræ only known.

The marked cornicles separate this genus.

JACKSONIA PAPILLATA Theobald.

Scottish Naturalist, Jan.-Feb., 1923, pp. 9 to 10.

Apterous viviparous female. Brownish-ochreous. Antennæ less than half length of body; segment i. much larger than ii., latter barrel shaped, both corrugated or scaly in appearance; iii. longer than iv., but shorter than vi.; iv. longer than v.; v. a little longer than base of vi.; flagellum not quite twice as long as base. Frontal processes very large, porrected, but in some

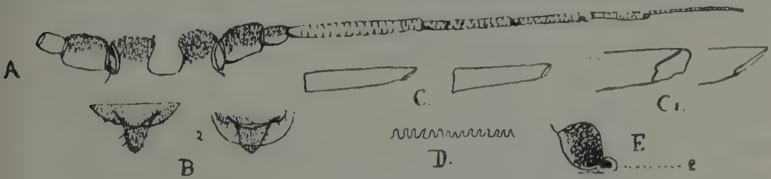

Fig. 143.—*Jacksonia papillata* Theob.

A. Head and antenna; B. Cauda and anal plate; 1, young, 2, adult; C. Cornicles; C1. Enlarged apex of C.; D. Cutaneous papillæ; E. Eye e. ocular process. (All of apterous ♀).

slightly projecting inwards, scaly or corrugated. Eyes large, dark, with red hue ; ocular process rather large and of abnormal form (vide figure). Cornicles cylindrical, in some expanding slightly at base ; apices with no flared lip and sloping, not flattened. Cauda very small, constricted at base, usually hidden under the anal plate, but in some extended, 2 fine hairs each side ; anal plate flat, narrow, broad, spinose, with a few short, fine hairs. Rostrum to or just past second coxæ, apex dusky. Legs rather short and broad ; femora with a few hairs ; tibiæ hairy. Skin covered with dense small papillæ, giving a corrugated appearance.

Length 1.5 mm.

FOOD PLANTS. Potato (*Solanum tuberosum*) ; Wild Creeping Jenny (*Lysimachia nemorum*).

LOCALITIES. Swordale, Evanton, Ross-shire, 23 viii. 22 (D. Jackson) ; Doncaster, vii. 25 (A. Dallman).

Observations. This very marked small Aphid was first found by Miss D. J. Jackson on Potato, under the leaves, and later by Mr. Dallman on the leaves of *Lysimachia nemorum.* The generic characters at once demark it, especially the peculiar cornicles. I could not breed out any alatæ from the live specimens sent me by Mr. Dallman.

Genus NEOMYZAPHIS Gen. Nov.

This genus is intermediate between *Myzus* and *Aphis*. From *Capitophorus* it differs in (1) the non capitate hairy nature of the body ; (2) the absence of the *marked* median cephalic process. From *Myzus* by the much smaller frontal tubercles, yet quite distinct and so not an *Aphis*. One species occurs in Great Britain : *Neomyzaphis abietina* Walker.

It is a serious Spruce Fir pest.

NEOMYZAPHIS ABIETINA Walker.*

Aphis abietina Walker.

Myzaphis abietina V. d. Goot.

Walker, Ann. Mag. Nat. Hist., III., Se. 2, 301 (1848) ; Buckton, Mono. Brit. Aphid., II., 43, pl. xlix., figs. 3 and 4 (1877) ;

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* This has recently been placed in Van der Goot's genus *Myzaphis*, but as Van der Goot cited Kaltenbach's *rosarum* as the type of the genus and as *rosarum* is a *Capitophorus*, *Myzaphis* has to sink as a synonym of the former and a new genus made for *abietina* for which I propose the name *Neomyzaphis*.

Gillanders, Forest Entomology, 304 (1908); Theobald, Rept. Eco. Zool., year ending Sept. 30th, 1911, 132 (1912); Theobald, Entomologist, XLIV., 398 (1911); Van der Goot, Tijdschrift. v. Ent., LVI., 96 (1913); Theobald, Anns. Appl. Biol., I., 22-36 (1914).

Apterous viviparous female. Green, oval, convex, with a darker line on each side of body. Head yellowish-green to fawn colour, with 2 foveæ. Antennæ about half the length of body, pale yellowish-green, darker at the tips; segment i. very wide; ii. small and narrow; iii. longer than iv.; iv. a little longer than v.; vi. not so long as iv. + v., basal area of vi. as long as flagellum, or nearly so; segments iii. to vi. imbricated. Eyes dull red. Proboscis green, dusky at apex, reaching to third coxæ. Cornicles pale yellowish-green, some with a brownish tinge, apex in some dusky, about one-quarter length of body; a few striæ and large reticulations at apex, the remainder strongly imbricated. Legs green, tarsi, tips of femora and the tibiæ dusky. Cauda green, rather long.

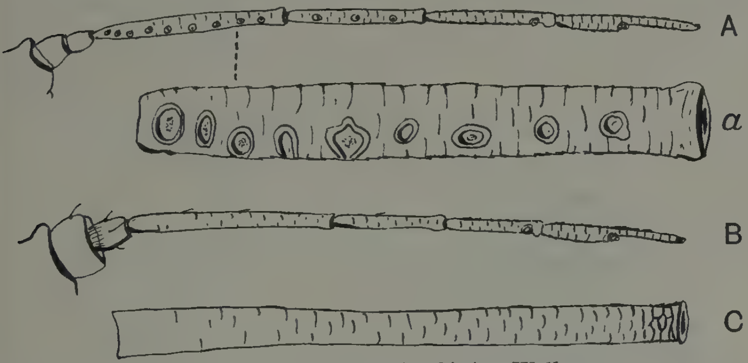

Fig. 144.—*Neomyzaphis abietina* Walker.

A. Antenna of alate female; *a.* further enlarged third segment; B. Antenna of apterous female; C. Cornicle of alate female.

Length 1 to 1.5 mm.

Alate viviparous female. Green; head large, a pale olive green to pale fawn colour; antennæ nearly as long as body, pale brown, segment iii. with 9 to 12 large sensoria along the whole length; iv. shorter than iii. with 2 to 4 sensoria; v. slightly shorter than iv.; vi. not so long as iv. + v., basal area about as long as flagellum; segments iii. to vi. imbricated. Eyes deep red. Rostrum fawn colour to green; mesonotum greenish, lobes dark; scutum and scutellum dark; venter of thorax dark. Abdomen bright green, dark sub-median lines, really made up of 4 darker spots, also four more or less distinct lateral spots. Segments caudad of cornicles marked and somewhat darker than rest. Cornicles pointed, cylindrical, straight, reaching beyond cauda, pale greenish to greenish-brown, in some slightly darkened at apices, with a few apical transverse striæ and some large hexagonal areas. Legs pale green or pale brown, rather short; femora thick, apices of tibiæ and the tarsi dusky. Wings large, much longer than body, apices rounded; stigma and veins pale brownish grey to green, subject to considerable variation in venation; the venation in the 2 wings often being totally unlike one another.

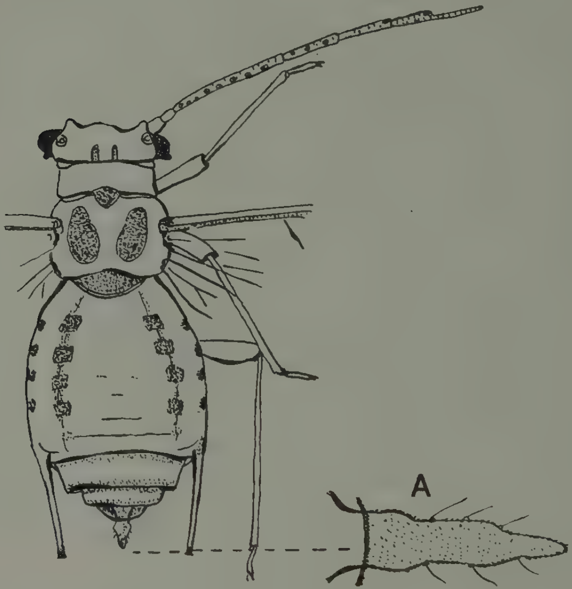

Fig. 145.—*Neomyzaphis abietina* Walker.
Alate viviparous female and further enlarged cauda A.

Rostrum green, dusky at apex, reaching to third coxæ. Cauda with 3 hairs each side, long.

Length 1 to 1.8 mm.

FOOD PLANTS. *Picea excelsa*; *P. sitchensis*; *P. pungens*; *P. engelmannii*; *P. nigra*; *P. alba*; *P. gigantea*; *P. rubra*; *P. morinda*; *P. orientalis*; *P. monstræ*; *P. omorica*; *P. kosteriana*; *P. glehire.*

LOCALITIES. Alnwick (Gillanders); Great Salkeld (Britten); Thirlmere, Grasmere, Manchester Corporation Water Works (Edwards); Windermere (Rymer Roberts); near Flamborough Head, (F.V.T.); Holmes Chapel, Cheshire (Young); Great Staughton, near St. Neots, Hunts.; Little Hadham, Herts.; Widdington, Essex; Kew Gardens; Rudgwick, Sussex; Woking; Guildford; Worplesdon; Esher; Kingston-on-Thames; Panton, near Wragby, Lincs.; Wye; Goudhurst; Tiverton; Fowey; Truro (F.V.T.); Culford, Bury St. Edmunds (Henry); Aberglaslyn; Criccieth (F.V.T.)*; Rathdrum, Co. Tipperary; Kilrush, Co. Clare; Camolin, Co. Wexford, Ireland. It also occurs in North America and New Zealand (Laing), Norway (F.V.T.).

Observations. During 1913 a very severe attack of the aphis described by Walker in 1849 as *Aphis abietina* took place on Spruce trees of various kinds. This aphis I have found in considerable numbers in the south of England for many years, but I have never known it until the summer of 1913 to do any serious harm there.

Since Walker's original account given in the *Annals and Magazine of Natural History*, the only references I know of it are those given by Buckton in his *Monograph of British Aphides* in 1877, and in Gillander's *Forest Entomology* in 1908. I also recorded it from Worksop in 1910 and from Kent in 1911. I have known, however, of this insect since 1899 when it was abundant on the Norway Spruce at Kingston-on-Thames, and on some of the Spruce trees in Richmond Park. Van der Goot placed this in his genus *Myazphis.*

I can find no reference to this Spruce aphis on the Continent, but I remember finding it near Odde in Norway in 1892. It is of erratic appearance. Districts in which it is quite common one year, may suddenly become comparatively free from it. Then after a lapse of time it may occur again in quantity. The only years in which actual damage has been noticed are 1846, 1906 and 1913.

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* This Aphid swarmed at Aberglaslyn in 1906 and did much harm.

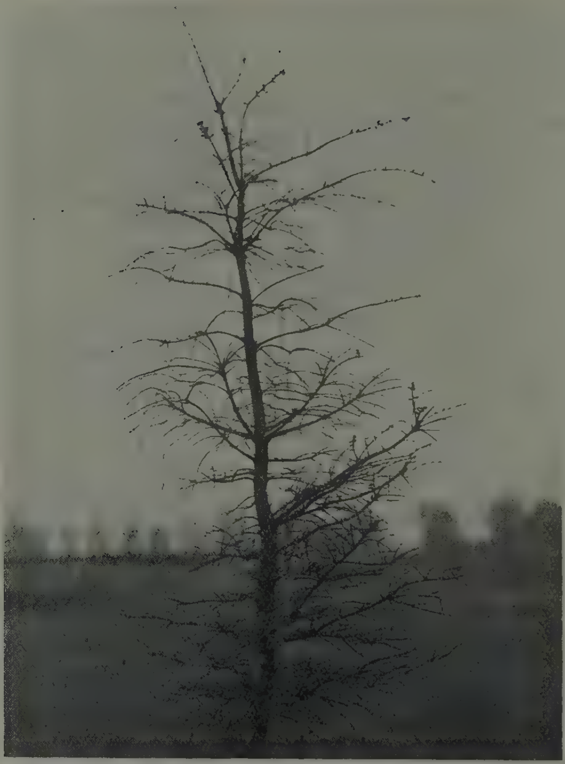

Fig. 146.—Sitka Spruce defoliated by *Neomyzaphis abietina* at Arndale (Dr. Henry).

It is quite possible that the damage caused by it on other occasions may have been put down to other causes, such as unsuitable soil, drought, etc.

Apparently immune varieties. Certain varieties of Spruce are apparently immune, such as P. *polita*, *P. hondoensis*, *P. acoguiana* and *P. alaskiana* and in some places *P. omorica* has not been attacked.

Varied degrees of attack on different species. Speaking generally the Sitka spruce is by far the most damaged, but this does not apply everywhere. For instance in the small nursery belonging to Wye College I was unable in 1913 to find a single specimen of this insect on the Sitkas, but *Picea excelsa* close to them were found to have any number on them and a few were badly damaged.

At Kew *P. sitchensis*, *P. pungens* and *P. engelmannii* were badly damaged, even trees twenty to thirty feet high, *P. nigra* and *P. alba* were in some cases damaged, others escaped. It was noticed here that the European and Asiatic species were damaged much less, the only seriously injured one being *P. excelsa*.

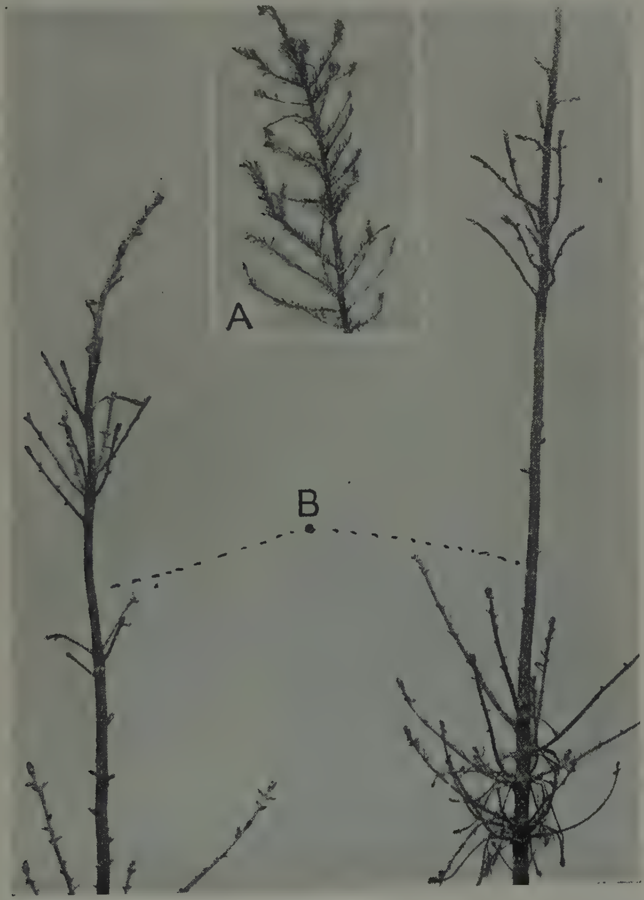

Fig. 147.
B. Sitka Spruce completely defoliated by *Neomyzaphis abietina* Walker.
A. First stage of attack.

In a large nursery I visited at Woking I found it doing great damage to *P. pungens*, *P. alba* and *P. sitchensis* and a great deal on *P. excelsa.*

In my garden one large *P. excelsa* was entirely browned by it another was partly ruined, whilst *P. pungens* var. *kosteri,* a large needled, very glaucous form, had some amount of aphis on three specimens, but two were affected scarcely at all and the aphis increased very slowly, one, which had been previously damaged by accident, was badly infested with this insect. All the other English records I have are on *P. excelsa.* Writing from Dundrum, Co. Tipperary, Mr. A. McRae says, " I find the common spruce of all ages, from nursery stock to matured trees of eighty years or over, are badly infested. On matured spruce the effects are most marked on partially isolated trees, growing on road sides or along the margins of belts and woods, on comparatively low ground, say 300 to 400 feet altitude. I also find the aphis in comparatively large numbers on old trees of white American spruce, but up to the present they do not show any very serious results. At Dundrum the Sitka would appear to succumb most readily to the attack ; in the nursery, however, the Sitka are not affected to the same extent as the Spruce, but the latter are larger trees and have been longer in stock than the Sitka."

Different effects produced on different varieties. Two very marked different effects are produced by this aphis. In *P. sitchensis* the damaged needles soon fall and complete defoliation results. In *P. excelsa* the needles turn brown, but the majority hang on and the tree looks as if it had been scorched by fire. On one tree in my garden the leaves partially kept on into the spring of 1914. The damaged needles certainly fall, but nothing like to the same extent as in the Sitka spruce.

In *P. morinda* they become partly defoliated ; in *P. engelmannii* the trees do not become defoliated, nor in *kosteriana* ; one of the latter attacked in my garden has every browned needle still holding on, much more so than in *excelsa.* Partial defoliation takes place according to Mr. Black in *glehire* and *monstrosa.*

Young *excelsa* do not present the same appearance as old ones when attacked, the needles instead of turning brown are mottled, where the aphis sucks yellow spots appear and this lasts through the winter. Writing from the Camolin Forestry Centre, Co. Wexford, Mr. A. Stewart says " the aphis is extremely plentiful on young Sitka and Norway spruce, but that in May not much damage had been done on the latter, but Sitkas are in many cases practically defoliated."

Mr. Murphy, of the Kilrush Forestry Centre, Co. Clare, found the few thousand Sitka spruce were attacked, but not badly, but that both Sitkas and Norway spruce in the plantations were practically immune.

It thus seems that both the Norway and Sitka Spruce are badly attacked and then next comes *pungens*, but that there is a marked difference in the appearances produced, i.e., complete

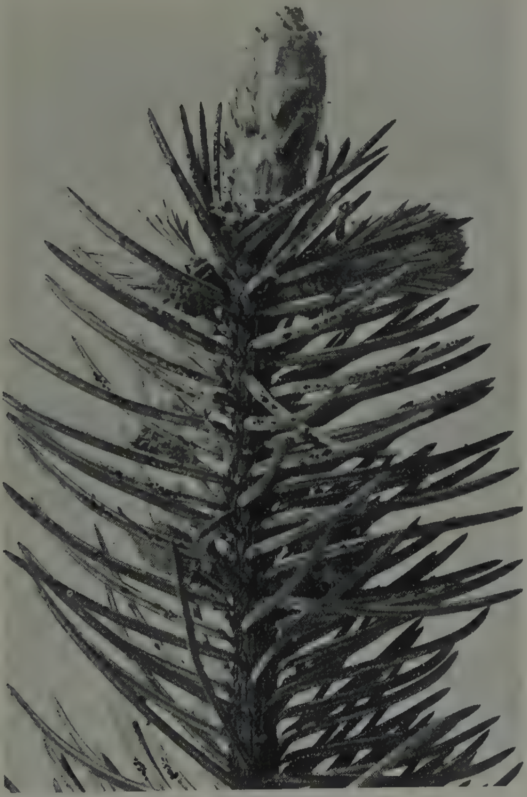

Fig. 148.

Picea pungens var. *kosteriana* showing aphides (*N. abietina*) on needles, but no defoliation.

and rapid defoliation in the Sitka, browning and slow defoliation in *excelsa* and still less defoliation in *pungens*, and scarcely any in the glaucous variety *kosteriana.*

I have found apteræ from early January on to December. The first alatæ occurred on the 20th of March at Woking, but in small numbers. At Wye I have never noticed any until June and in July many occurred and went on appearing in numbers into August. After August the trees kept under observation showed comparatively few aphis until the end of September, when they again became fairly common and some could always be found right into December. These winter apteræ seldom produce any living young. At this time both mature and immature apterous viviparous females occur.

Gillanders says that it may be found in winter. Mr. McRae writes me that where infestation is serious the aphis appears to live on the trees throughout the winter, and Mr. Black also noticed that this aphis persists throughout the year. I have vainly searched for sexuales.

The apterous aphides usually occur along the needles, a single one settling on each needle and giving rise to a colony of young, which later spread out and do the same ; where the apterous mother feeds a yellow spot occurs, sometimes with a reddish tinge and which later darkens ; two or three of these spots on a needle on old trees seem sufficient to kill the needle, whilst in young ones, the needles are but seldom completely killed. The aphides also wander about on the shoots and remain and feed there.

They do not seem to attack the new growth to any extent in summer, but in autumn and winter a few may be found on the young growths.

In October and November I counted about six apteræ to every foot of branch examined, and a few small young with them. The insect is very sluggish both when in the apterous and alate stages, but if a branch is cut off they become active in a few hours and wander away from the needles.

It thus appears that this insect lives normally through the winter as apteræ and that sexuales must be very rare and are so far unknown.

In the winter 1913-1914, I found apterous viviparous females again right through the winter, a weekly search being made, and they now and then produced living young.

Natural Enemies. In spite of this aphis having several natural enemies, they do not seem to have any effect upon it when weather conditions are favourable to it and unfavourable to the host plants. I have failed to find any parasites or predacious insects attacking it in winter when they might clear off the comparatively small numbers that then occur, nor do they appear until June or July, long after the aphides have done their worst harm.

Later in the year they are preyed upon by a number of natural enemies. The chief amongst these are several spiders, at least two species of Phalangidæ or 'harvest men,' and the adults of *Scymnus* sp. and its larvæ to a small extent. That spiders and Phalangids do good there is no doubt. But the most interesting enemy this aphis has that I have seen is the Long-eared Bat. A tall tree in my garden was every night in July surrounded by these animals, hovering like a large moth at the tips and sides of the top branches, and clinging on to them. Wishing to know what they were so assiduously hunting for, I shot one and found it was full of hundreds of *Neomyzaphis abietina*, not only the alate females, but the apteræ and nymphæ that they must have taken from the needles.

I bred only two Chalcids. Several Syrphid larvæ were active amongst them and *Adalia bipunctata*.

In plantations of course nothing can be done that would pay to do, but in nurseries and where any special trees we wish to save are attacked, we can very easily destroy this pest. Paraffin jelly, nicotine and soft soap, quassia and soft soap, soft soap alone, lime sulphur wash and such patent washes as White's Abol, MacDougall's Summer Wash, and Cook's Tobacco Wash were tried. All, with the exception of lime sulphur and soft soap alone, killed great numbers, but the best results were obtained with Cook's Tobacco Wash, then with nicotine and soap and slightly below these came Abol, MacDougall's Summer Wash, and paraffin jelly, then soft soap and quassia. Soft soap alone was not found sufficiently penetrating to do much good. Lime sulphur at summer strength had no effect at all. The main thing is to give a very fine spray applied with force and to well wet the foliage. Winter treatment with strong paraffin jelly yielded excellent results and probably will prove to be the best method of treatment.

I have to thank Dr. Henry for the information sent me from Ireland.

Genus PHORODON Passerini.

Passerini. Gli Afidi, 27 (1860); Baker, Bull 826, U.S. Dept. Agri. 58 (1920).

A marked genus which contains but few species. The type is the common Hop-Prune Aphid, *Aphis humuli* Schrank. The characters of the genus are as follows: Very prominent processes on frontal lobes, in the apteræ, extending forwards in front of head. Alate female with frontal tubercles distinct, projecting slightly inwards. Antennal segment i. of apteræ with projecting process; antennal segment i. of alate female gibbous. Cornicles cylindrical and thin. Cauda not so long as cornicles, rather conical. Males alate. Oviparous females apterous. The marked processes on the head and antennæ at once separate the species of this genus. Kaltenbach's *galeopsidis* was placed here, but it is a *Capitophorus*, and is only the *ribis* of Linnæus. Walker's *flaveolus* is also a *Capitophorus*.

BRITISH SPECIES OF *Phorodon*.

Phorodon humuli Schrank.
,, *cratægarium* Walker.
,, *menthæ* Buckton.
,, *inulæ* Passerini.

FOOD PLANTS OF *Phorodon*.

Cratægus spp.	P. cratægarium Wlk.
Galactites tomentosa	P. inulæ Passerini.
Humulus lupulinus and *japonicus*	P. humuli Schrank.
Inula coryza	P. inulæ Passerini.
Mentha aquatica	P. menthæ Buckton.
Mentha arvensis	P. menthæ Buckton.
Mentha viridis	P. menthæ Buckton.
Prunus spp.	P. humuli Schrank.
Pyrus malus	P. humuli Schrank.
Tussilago farfara	P. inulæ Passerini.
Urtica dioica	P. humuli Schrank.

PHORODON HUMULI Schrank.

Aphis humuli Schrank.
Aphis pruni Scopoli.
Phorodon humuli v. *mahaleb* Buckton.
Phoroelon cannabis Das.

Schrank, Fn. Boica., II., 110, 1199 (1801); Scopoli, Ent. Carn., 138, 406 (1763); Kaltenbach, Mono. Pflanz., 36, 24 (1843); Walker, Ann. Nat. Hist., Se. 2, VI., 120, 98 (1848); Walker, List. Homop. (B.M.), IV., 997, 106 (1852); Koch, Die Pflanz., 113, 114, pl. 21, figs, 150-154 (1854); Buckton, Mono. Brit. Aphid, 1, 166, pl. XXX. and XXXI., figs. 1-4 (1875); Thomas, Nat. Hist. Illinois Bull. II., 9 (1878); Riley, Insect Life, 70 (1888); Theobald, Journ. S.E.A. Coll., IX., 35-41, pl. V. (1900); Theobald, Journ. Bd. Agri., XVI., 617-622 (1909); Remisch, Zeit. Ff. Ins. Biol., 241 (1911); Matsumura, Journ. Coll. Agri. Tohoku, Imp. Univ., VII., 362 (1917); Swain, Univ. Calif. Tech. Bull., III., 3-79 (1919); Takahashi, Aphid, Formosa, I., 27 (1921); Theobald, Miss. Pub. Min. Agriculture, No. 42 (1925).

Alate viviparous female. (First migrant.) Pale green to apple green, paler beneath. Head dark brownish; a dark line or band on pronotum; dark brown thoracic lobes. Abdomen with dark transverse bars and 3 to 4 black lateral spots. Anal plate black. Cauda green. Cornicles green. Legs green, apices of femora and tibiæ brown; tarsi black. Eyes reddish-brown. Wings large, the cubitus and stigma greenish-yellow. Antennæ about as long as body; green to dusky-green, especially at apex; segments i. and ii. darkened, base of iii. palest; segment i. larger than ii., with a blunt apical process on the inner side; iii. longer than iv. and not quite so long as vi., with 27 to 33 sensoria over its whole length; iv. very slightly longer than v., with 3 to 6 irregularly disposed sensoria; v. less than half length of vi.; the flagellum long. Head with small lateral processes and the median ocellus on a prominent process. Rostrum reaching nearly to second coxæ, which are close to the third and some way from the first. Cornicles shorter and thicker than segment iii. of antennæ, darker green in some than others, imbricated, projecting well beyond the cauda. Cauda one third to less the length of the cornicles, spinose, bluntly acuminate, expanded basally, with 5 or more pairs of rather long hairs.

Length 1.8 to 2 mm.

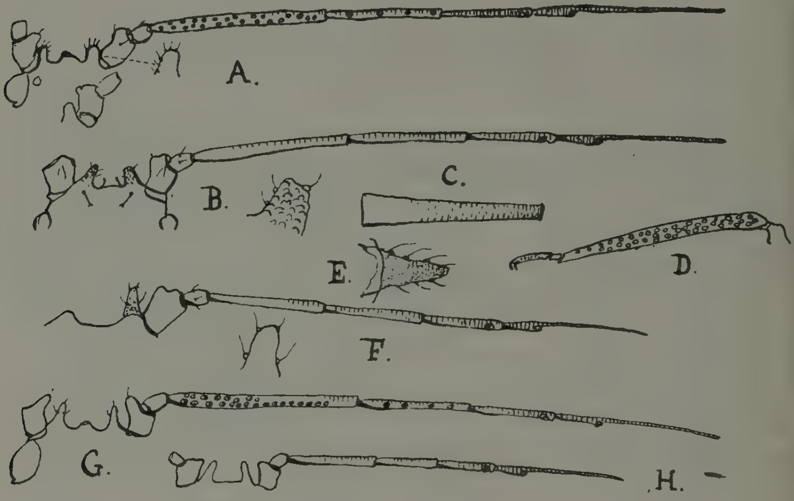

Fig. 149.—*Phorodon humuli.* Schrank.
A. Head and antenna of alate ♀ migrant ; B. Head and antenna of apterous ♀; C. Cornicle ; E. Cauda apt ♀ (prune) ; F. Head and antenna of apterous ♀ (hops) ; D. Tibia oviparous ♀; G. Head and antenna of male ; H. Head and antenna of oviparous ♀.

Apterous viviparous female (on Prunus). Yellowish-green, with 3 deeper green irregular lines on the body, the median one more regular than the lateral, the latter frequently zig-zag. Elongated oval in form. Head rather narrow. Eyes small and red. Legs and antennæ green, now and then the tarsi slightly dusky. Rostrum green, reaching to second coxæ. Legs nearly equidistant apart. Frontal tubercles porrected, prominent, not quite reaching the level of the apex of antennal segment i. Segment i. of antennæ much larger than ii., with a blunt apical process on inner side ; iii. longer than iv., and equal to or rather longer than vi. ; v. about as long as iv. ; basal area of vi. about one-third of flagellum. Cornicles green, as long as or slightly longer than antennal segment iii. and thicker ; faintly imbricated. Cauda green, much shorter than cornicles ; spinose, with 3 pale hairs each side. Anal plate green. Tibiæ with short hairs.

Length 2.7 to 3 mm.

Apterous viviparous female (on Hop). Somewhat similar to the former, but narrower, more shiny and transparent ; the three dorsal stripes not so well developed ; body rather narrower. Frontal tubercles large and somewhat different in form to the former. Segment i. of antenna larger than ii., with a well-defined blunt tooth on its inner margin towards the apex ; otherwise very similar. Cornicles and cauda similar in colour, but the former not so straight and longer than antennal segment iii. Rostrum reaching to second coxæ.

Length 1.3 to 2 mm.

Alate viviparous female (Return migrant on Hops). Very similar to spring migrant. Antennal segment iii. with 23 to 30 sensoria ; iv. with 3 to 8. Abdomen with 3 to 4 lateral dark spots, as well as the usual transverse dark bars. Cornicles, cauda and legs much as in former. Anal plate dark. Femora dark, except at base ; tibiæ green, except just at apices ; tarsi dark.

Length 1.7 to 1.9 mm.

Male. Alate. Green ; head and thorax dark. Abdomen with 3 large dark lateral spots, a dark dorsal patch and one at base of each cornicle, caudad ; anal plate dark. Cauda and cornicles dark. Antennæ dark green. Legs green, except apices of femora, tibiæ and the tarsi. Antennæ longer than body ; segment i. larger than ii., with a dentate process apically ; iii. longer than iv., with 23 to 25 sensoria ; iv. slightly longer than v., with a few sensoria. Eyes large, dark. Rostrum not reaching to second coxæ. Sternal plate dark. Cornicles thin, cylindrical, much shorter than antennal segment iii. Cauda much thicker and shorter than cornicles. Claspers dark. Wings much longer than body.

Length 1.5 to 1.8 mm.

Oviparous female. Apterous. Yellowish-green ; antennæ green at base, dusky at apex. Legs green, except hind tibiæ which are dusky. Cornicles, cauda and rostrum yellowish-green. Antennæ shorter than body ; segment i. much larger than ii., with a large dentate process near apex of inner edge ; iii. a little longer than iv. and a little shorter than vi. ; iv. and v. about equal ; flagellum of vi. rather short. Frontal processes of head very prominent. Cornicles cylindrical, somewhat curved inwards, about as long and slightly thicker than segment iii. of antennæ.

Cauda broad, about half length of cornicles. Legs rather short and thick; many sensoria on hind tibiæ except just near apices.

Length .8 to 1.0 mm.

FOOD PLANTS. Hops (*Humulus lupulinus* and *H. japonica*) *Prunus spp.*, especially Sloe, Bullace, and Damsons, now and then on various Plums. Apple (*Pyrus malus*)*; Nettle (*Urtica dioica*).

LOCALITIES. Kent, Sussex, Hampshire, Worcestershire, Herefordshire, Shropshire, Hertfordshire, Bucks., Devon, Surrey; Merthyr Mawr, Glamorgan, Wales. Common in all the hop-growing districts; Belgium, Germany, America; Japan (Tokio); Formosa, Taihoku (Takahashi); India (Das).

Observations. This is a widely spread and very destructive Aphid in Hop districts in Europe and America. It also occurs in Japan. It is particularly destructive in certain years in Kent, Sussex, Surrey, Hampshire, Worcestershire and Herefordshire. It can now be easily controlled by spraying either with soft soap and quassia, or better still soft soap and nicotine. Late attacks however, occur in certain years when the hops are in cone and then much damage may be done as spraying is impossible. In some years, when spraying has not been carried out, the crop became a total failure. In 1802 the excise duty paid on hops of the previous year fell from £100,000 to £14,000 and the deterioration in value was entirely due to the "fly." In some parishes in Kent not a single hop was picked. During that year it was estimated that the whole produce of the hop-lands in England, 65,619 acres, did not exceed 114,832 cwts., or an average of 1½ cwt. per acre. The annual average yield then being 7 cwt. per acre. It is no new pest, for hops are known to have been liable to its attacks for over 200 years. These attacks have usually been spoken of as "Black Blight." Whitehead in 1885 says: "They have been of more frequent occurrence during the last fifty years." Since then they have been less evident, owing to control by spraying. Although attack on the foliage can be dealt with by spraying, it cannot be when the insects invade the cones and the crop may be partially or wholly ruined.

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* Found once breeding on Apple trees at Wye and continued to do so for some weeks.

Phorodon humuli has many natural enemies; both larvæ (Niggers) and adults of the Two Spotted Lady-bird (*Adalia bipunctata*) and the Seven-Spotted Lady-Bird (*Coccinella septempunctata*) feed upon them. A few Aphis Lions, larvæ of the Lace-Wing or Golden Eye flies (*Chrysopidæ*) also feed upon them, and so do some of the "leech-like" larvæ of the Hover Flies or *Syrphidæ*. So far I have never found any Chalcids attacking the Hop Aphid.

The Life-History is briefly as follows: The winter is passed in the egg stage on the sloe, bullace, damson and more rarely the plum. The shiny black ova are laid in the axils of the buds. They hatch from the end of March into April. The young or "lice" quickly grow into apterous females, or "Mother Queens," which produce numbers of pallid, semi-transparent living young. These feed on the Prune leaves and may soon reach maturity, producing other apterous viviparous females, which again give rise to swarms of living young. Towards the first or second week in May they assume the pupal or nymph stage and from near the end of May, well into June, alate viviparous females—the spring migrants—are formed, and these fly off to the Hops, where they settle on the leaves as the so-called "Hop Fly." In some years the "Fly" may appear on the hops as early as mid-May and now and again this insect may continue to breed on the Prunes into August and a late attack on the hops may then take place. They may be found on most leaves, but the majority settle on the tender foliage of the bine and there in the crevices of the yet unfolded leaves, and the slightly opened ones, they lay countless small pale semi-transparent green or almost white young, the so-called "Hop Lice." These in turn become apterous viviparous females, which again produce living young; this may be in as short a space of time as ten days, and this goes on for several generations. Now and then I have observed in August that nymphæ may occur on the hops and that alate viviparous females result, which fly off to other hops and so start a fresh attack. Later the Aphides all leave the hops and fly back to the prunes where the sexuales are produced, but most of the males which are alate are produced on the hop-bine in late September and October, whereas the apterous oviparous females are all formed on the Prunes. Fertilisation takes place on the Prunes, the males die and the females deposit their eggs. In

1898 I found a few apterous females in hop-hills in February. Several growers have also told me that they have noticed aphis on the hops very early in the year. Moreover, at Stoke Edith, experiments carried out in 1884, showed that where the hills were dressed no early lice appeared, but the rest of the garden was infested. It thus appeared that this destructive hop Aphid could live in two ways during the winter, just as the Woolly Aphid of the Apple (*Eriosoma lanigerum*) does. The specimens I found were never closely examined, but in 1923 in the Faversham area a *Myzus* was discovered attacking the hops as soon as they came through and this continued according to the grower and did considerable harm ; he noticed it as being different from the common hop aphis, and it is more than probable that this *Myzus* is the insect taken formerly to be the possible ground form of *Phorodon humuli*. This Myzus is the *chelidonii* of Kaltenbach.

There may be a ground form, but it has not yet been demonstrated. The usual life is a migration between the winter progeny on the prunes to the hops and back to the prunes in autumn. The prune form was looked upon originally as a distinct species, *Aphis mahaleb* Koch., but Dr. Plomley many years ago proved that there was a migration from the prunes to the hops, so that Koch's *mahaleb* was the same as Schrank's *humuli*.

PHORODON MENTHAE Buckton (P.).

Siphonophora menthae Buckton.
Phorodon menthae V. d. Goot.
Myzus menthae Takahashi.

Buckton, Mono. Brit. Aphid., I., 120, pl. IX., figs. 182 (1875) ; Van der Goot, Kenntnis Holland, Blattl., 134 (1915) ; Takahashi, Aphid Formosa, Pt. 2, 22, pl. VIII., B. figs. 1-6 (1923).

Alate viviparous female. Green ; head deep olive green ; thoracic lobes deep brown ; antennæ deep olive-green to brown, except base of iii., and all i. and ii. Cornicles and cauda green, somewhat darker than body. Legs same colour as body, apices of femora and tibiæ dark. Rostrum green, apex dark. Eyes deep red. Antennæ longer than body ; segment i. much larger than ii., with a large inwardly projecting process ; iii. a little longer than iv., with 30 to 39 pale unequal sized sensoria over its whole length ; iv. about as long as or a little longer than v., with 14 to 16 small pale sensoria along one side ; v. with 0 to 10 small sensoria along one side, unevenly disposed ; flagellum of vi. longer than iii. Rostrum reaches second or third coxæ. Head with marked lateral inwardly projecting processes and a median process. Cornicles cylindrical, shorter and about same width as antennal segment iii., a few striæ at apices. Cauda more than half length of cornicles, with 2 hairs each side and a dorso-apical one. Wing veins rather deep brown.

Length 2 mm.

Apterous viviparous female. Green. Antennæ dusky at apices. Apices of tibiæ and the tarsi dark. Rostrum green, apex dark. Antennæ longer than body ; segment i. much longer than ii., with a marked process on its inner side ; iii. much longer than iv., not so long as vi. ; iv. and v. about equal ; flagellum of vi. longer than iii. Head with marked frontal processes. Rostrum reaches to or past third coxæ, narrow and bare ; apical segment a little longer and narrower than penultimate . Cornicles cylindrical, narrow, pale green, shorter than antennal segment iii., or a little thicker, imbricate, reaching well beyond cauda. Cauda pale yellow-green, with numerous lateral hairs. Anal plate green. A few short capitate cephalic hairs.

Length .7 to .9 mm.

FOOD PLANTS. Water Mint (*Mentha aquatica*) ; *Mentha arvensis* var *vulgaris* and Garden Mint (*Mentha viridis*).

LOCALITIES. Windermere, 16 viii. (Rymer Roberts) ; Wye, 2 viii. 17 (F.V.T.) ; Bartley ; New Forest, viii. 22 ; Chelsea, S.W. 3, v. 19 (F. Laing) ; Penyffordd, N. Wales, 10 vii. 23 (Walton) ; Holland (V.d.Goot) Taihoku, Formosa (Takahashi).

Observations. This species comes intermediate between *Phorodon* and *Capitophorus*. It resembles *C. ribis* (=*C. galeopsidis*) but the apteræ lack the long capitate hairs and the processes on head and basal antennal segment are large, in some approaching almost *Phorodon humuli*. It lives under the leaves of the Water Mint, often close to the damp earth or water, and also in the blossom heads. On the Garden Mint it lives in the same manner. This is evidently the insect referred to by Van der Goot as *Phorodon mentharius* (1912), which he described later as *Phorodon menthae*. On Buckton's slide in the British Museum is also an alate *Myzus persicæ*, an apterous ♀ *Myzus sp.* and a nymph of *menthae*. I take it that the alate ♀ described here is the type of *menthae* and also the nymph on his slide.

PHORODON CRATÆGARIUM Walker (non Buckton).

Macrosiphum cratægarium Theobald.

Theobald, Journ. Eco. Biol., VIII., 142, 49 (1913).

Apterous viviparous female. Green to yellowish-green; antennæ pale brown, except at base; tarsi brown. Eyes black to red black. Antennæ a little longer than body; segment iii. a little longer than iv.; iv. a little longer than v.; vi. not quite as long as iv. + v. Two marked blunt tubercles projecting forwards on the head. Rostrum reaches to third coxæ. Cornicles long, cylindrical, pale green, a few large reticulations at apices. Cauda pale green, rather long. Legs pale green, tarsi dusky brown; apices of mid-tibiæ slightly darkened; a few short hairs on tibiæ.

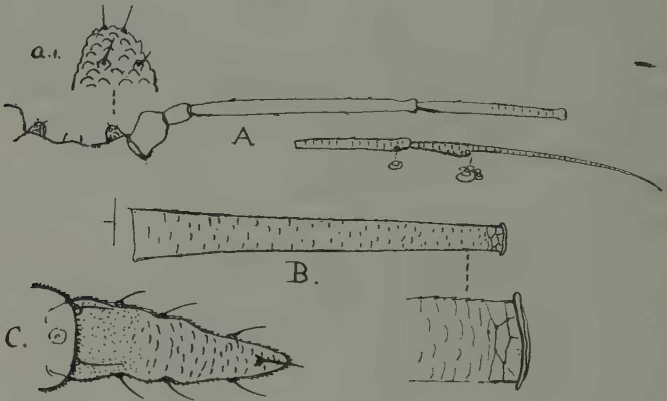

Fig. 150.—*Phorodon crataegarium* Walker.
Apterous viviparous female. A, Head and antenna; A.I. frontal process
B, Cornicle; C, Cauda.

Length 1.5 to 2 mm.

Alate viviparous female. Rather long, pale green of various shades; head and thoracic lobes reddish-brown; abdomen with a row of black spots on each side; antennæ dark brown, a little longer than body; rostrum pale green, apex brown. Cornicles pale green, about one-fourth length of body. Legs pale yellow to pale green, tips of femora and tibiæ and the tarsi brown.

The antennal segment i. larger than ii.; iii. long, a little longer than iv., with 62 to 65 sensoria; iv. longer than v., iv. with 50 to 55; v. with 13 to 18 sensoria; base of vi. about one-third of v.; flagellum very long. Rostrum not quite reaching second coxæ. Cornicles thin, cylindrical, about one-half of antennal segment iii. Cauda about half length of cornicles, much wider, finely spinose, three fine hairs each side. Anal plate broadly triangulate.

Length 1.6 to 1.9 mm.

FOOD PLANT. Hawthorn (*Cratægus oxyacanthæ*).

LOCALITIES. Wye, 7 vi.; 1 viii. 11 and vi. 25; Cambridge, vi. 87; Widdington, Essex, 14 vi. 22; Guildford, 12 vi. 13; (F.V.T.); Bangor, 12 v. 23 (Walton); Lyndhurst, Hants.; Swanley, Kent (Laing); Southgate, 28 viii. 47 (Walker); Port Seton, E. Lothian, 7 viii. 22 (Evans).

Observations. A marked Hawthorn species, easily told by the curious tubercles on the head in the apteræ. This insect occurs in masses on the tips of the young hawthorn shoots and under the top leaves. I have not found or bred alatæ, but have described some of Walker's specimens in the Dublin Museum.

What must be regarded as the type of *cratægarium* is in the Dublin Museum, as there is a Walkerian slide so-named there. There are Walkerian slides of this species both in the British Museum and the Hope Museum, Oxford, under the MS. name of *cratægina* but on publishing his description Walker evidently changed his specific name to *cratægaria* without changing the name on the labels of all his slides. The only slide of *cratægaria* in the Buckton Collection in the British Museum represents *Aphis pomi* De Geer.

PHORODON INULÆ Walker.

Aphis inulæ Walker.
Phorodon inulæ Passerini.

Walker, Zoologist, VII., App. xlv. (1849); Walker, List Homop (B.M.), IV., 1022. 233 (1852); Passerini, Gli Afidi. 18 (1860); Schouteden, Ann. Soc. Ent. Belg., XII., 234 (1892).

I have failed to find any alate females, so append Walker's description of this stage:

"*Alate viviparous female.* Wings colourless; veins pale; brands dusky towards the top; distance between first and second veins at the tips about twice that at the base; third a little nearer to the second at the base than at the tip, a little further from the second at the base than the second is from the first; first fork as near to the third vein as to the second fork, much nearer to the third vein than the third is to the second; second fork as near to the fourth vein as to the first fork; fourth vein much curved, very little nearer to the tip of the rib-vein than to the second fork. *Var.* First fork much nearer to the third vein than to second fork; second fork nearer to the 4th vein than to the first fork." (Walker.)

Oviparous female. Pale yellowish to almost transparent yellow. Eyes dark. Apices of tibiæ faintly dusky; hind tibiæ much broadened and dark. Antennæ slightly shorter than body; dusky towards apex. Cornicles green to pallid yellowish-green; cylindrical, slightly expanding basally, longer than antennal segment iii., but shorter than vi. Cauda pale green, much broader than cornicles. Segment i. of antennæ much wider, but scarcely larger than ii.; iii. longer than iv., but shorter than vi.; iv. and v. nearly equal; basal area of vi. not quite half length of v.; flagellum nearly as long as iv. + v. Processes on head moderately pronounced and such as might place it in *Myzus* and not *Phorodon*. Rostrum dusky at apex, reaching past second coxæ. Legs moderately long and rather thick; hind femora with many sensoria, thickened towards base, narrowed apically. Cornicles showing faint imbrications and a faint stria or two apically. Cauda slightly less than half length of cornicles, bluntly acuminate, spinose, with 3 curved hairs each side.

Length .8 to .97 mm.

Apterous viviparous female. Yellow to citron yellow; apices of antennal segments iii. to v. dusky; vi. dusky. Eyes red. Tarsi dusky. Antennæ longer than body; segment i. much larger than ii., with a marked process at apex, inside; iii. longer than iv., but not so long as iv. + v.; iv and v. about equal, in some the latter slightly the longer; vi. long, basal area about half v.; flagellum about as long as iii. + iv. A marked process each side of head and a small median elevation. Rostrum reaching to nearly third coxæ, dark at extreme tip. Cornicles cylindrical, pallid yellow, about as long as and same width as antennal segment iii., slightly expanding basally. Cauda pallid yellow, from half to rather more the length of cornicles; wider and bluntly pointed, with 2 hairs each side and 1 median sub-apical one. Anal plate more or less rounded, delicate yellow, with 4 rather large hairs. Tibiæ with a few hairs.

Length 1 to 1.3 mm.

FOOD PLANT. Flea Bane (*Inula dysenterica*).

LOCALITIES. Wye, 18 x. 13; Sandwich, 19 viii. 22 (F.V.T.); Lancaster (Walker); Belgium (Schouteden); Italy (Passerini).

Observations. I have only found this insect in any numbers as oviparous females, with nymphæ. In 1913 they swarmed on the Flea Bane at Wye. Since, I have only found it once in that stage and a few apterous viviparous females at Sandwich. Schouteden has described the male and oviparous female (Ent. Soc. Belg., XLIV., 118).

Genus MYZUS Passerini.

Rhopalosiphum Passerini.
Myzoides Van der Goot.
Ovatus Van der Goot.
Myzodes Mordwilko.
Aulacorthum Mordwilko.
Neomyzus Van der Goot.
Myzopsis Matsumura.

Passerini, Gli Afidi, 27 (1860); Van der Goot, Tijds. v. Ent., LVI., 84 (1913); Mordwilko, Faune Russe. Aphidoidea, 52 and 58 (1914); V. d. Goot, Zur. Kennt. d. Blattläuse Javás, 50 (1916); Matsumura, Trans. Sapporo Nat. Hist. Soc., VII., pt. 1, 19 (1918); Baker, Bull. 826, U.S.A. Dept. Agri. 57 (1920).

The genus *Myzus* was founded by Passerini on *Aphis cerasi* Fabr. At the same time he used *Aphis persicæ* Sulzer as the type of the genus *Rhopalosiphum*; the type of the latter genus, however, was fixed by Gerstæcker in 1856 as *nymphea* Linnæus, which genus comes in the Aphidini. The *persicæ* of Sulzer is an undoubted *Myzus*. Van der Goot took the type of *Myzus* (*cerasi*) as the type of his *Myzoides* and consequently this name must sink as a synonym. In 1916 he created another genus, *Neomyzus* for Buckton's *circumflexum*, but this is a true *Myzus*. The *tabaci* of Mordwilko, type of his genus, also seems to be a *Myzus*. Van der Goot's *mespili* is apparently a *Myzus*, so *Ovatus* must also sink.

Characters. Frontal tubercles distinct, especially in apteræ; they project inwards and are strongly gibbous, notably in the males. Antennæ of six segments; i. gibbous, like frontal processes; about equal in length to body. Cornicles rather long, cylindrical, in some slightly swollen in places, but never really clavate, as in *Rhopalosiphoninus*. Cauda prominent, somewhat conical, constricted very slightly or not at all, from half to less the length of the cornicles. Legs moderately long. Wing venation normal. Oviparous females apterous. Males alate.

There has been much confusion between the members of this genus and those of *Macrosiphum* on the one hand, and *Aphis* on the other. The genus can at once be told, however, by the frontal lobes being gibbous or porrect, and not sloping outwards as in *Macrosiphum*, nor flat or nearly so as in *Aphis*. From *Rhopalosiphoninus* it can be readily distinguished by its longer and thinner non-clavate cornicles. Buckton says: "The chief difference from the preceding genus (*Phorodon*) is the absence of the tooth on the first antennal segment, except from the very remarkable development of the frontal tubercles in the viviparæ of *P. humuli*, the two genera might be united." This character separates them very definitely.

SPECIES OF *MYZUS* IN GREAT BRITAIN.

Myzus cerasi Fabricius.
,, *galiifolium* Theobald.
,, *mollugínis* Koch.
,, *molluginellus* Theobald.
,, *laricellus* Theobald.
,, *lactucæ* Schrank.
,, *aquilegiæ* Theobald.
,, *hieracii* Kaltenbach.
,, *duffieldii* Theobald.
,, *piceællus* Theobald.
,, *ranunculinus* Walker.
,, *pseudosolani* Theobald.
,, *persicæ* Sulzer.
,, *vaccinii* Theobald.

Myzus polygoni Buckton.
,, *glaucii* Theobald.
,, *circumflexus* Buckton.
,, *hydrocotylei* Theobald.
,, *festucæ* Theobald.
,, *convolvuli* Kaltenbach.
,, *primulæ* Theobald.
,, *polyanthi* nov. sp.
,, *gracilis* Buckton.
,, *impactus* Walker.
,, *lythri* Schrank.
,, *pseudolamii* Theobald.
,, *chelidonii* Kaltenbach.
,, *veronicellus* Theobald.
,, *neogei* Theobald (n.n.).
,, *mercurialis* Theobald.
,, *eupatorii* Passerini.
,, *longipennis* Buckton.
,, *myrmecophilus* Theobald.
,, *erigeroniellus* nov. sp.
,, *conterminus* Walker.

FOOD PLANTS OF *Myzus*.

Acer platanoides	M. gracilis Buck.
Alisma sp.	M. circumflexus Buck.
Almond	M. persicæ Sulz.
Antirrhinum sp.	M. persicæ Sulz.
Aquilegia spp.	M. aquilegiæ Theob.
Atriplex spp.	M. persicæ Sulz.
Arctium lappa	M. persicæ Sulz.
Asperula odorata	M. cerasi Fabr.
Aubretia	M. persicæ Sulz.
Auricula sp.	M. polyanthi sp. nov.
Avena sativa	M. circumflexus Buck.
Beta maritima	M. persicæ Sulz.
Beta spp.	M. persicæ Sulz.
Cakile maritima	M. conterminus Walk.
Centhranthus ruber	M. persicæ Sulz.
Cerasus vulgaris, etc.	M. cerasi Fabr.
Cestrum newelli	M. persicæ Sulz.

Cestrum newelli	M. hieracii Kalt.
Cerastium semidecandrum	M. persicæ Sulz.
Chrysanthemum	M. circumflexus Buck.
Cyclamen	M. circumflexus Buck.
Cineraria	M. circumflexus Buck.
Convolvulus major	M. convolvuli Kalt.
,, ,,	M. circumflexus Buck.
Cratægus sepium	M. convolvuli Kalt.
Crepis viridis	M. lactucæ Schrk.
,, ,,	M. hieracii Kalt.
Chenopodium spp.	M. persicæ Sulz.
Chrysobactron sp.	M. persicæ Sulz.
Calla sp.	M. circumflexus Buck.
Dahlia	M. circumflexus Buck.
Euonymus sp.	M. persicæ Sulz.
Erigeron acris	M. erigeroniellus sp. nov.
Eupatorium cannabinum	M. eupatorii Pass.
Euphrasia officinalis	M. cerasi Fabr.
Festuca ovina	M. festucæ Theob.
Fresia	M. circumflexus Buck.
Geum urbanum	M. neogei Theob.
Galium aparines	M. cerasi Fabr.
,, *cruciata*	M. galliifolium Theob.
,, ,,	M. cerasi Fabr.
,, *mollugo*	M. molluginis Koch.
,, *sp ?*	M. molluginellus n.sp.
,, ,,	M. cerasi Fabr.
Glaucium luteum	M. glaucii Theob.
Hieracium murorum	M. hieracii Kalt.
,, *pilosellæ*	M. hieracii Kalt.
,, *sylvestris*	M. hieracii Kalt.
Hordeum	M. circumflexus Buck.
Humulus lupulinus	M. chelidonii Kalt.
Hydrocotyle vulgaris	M. hydrocotylei Theo.
Lepidium spp.	M. cerasi Fabr.
Linum sp.	M. circumflexus Buck.
Lamium purpureum	M. pseudolamii Theob.
Larix europæus	M. laricellus Theob.
Lactuca spp.	M. lactucæ Schrk.
Lycium sp.	M. circumflexus Buck.

Lysimachi sp.	M. polyanthi sp. nov.
Lythrum salicaria	M. lythri Schrk.
Matricaria inodora	M. persicæ Sulz.
Mercurialis officinalis	M. mercurialis Theob.
Nemophilus sp.	M. convolvuli Kalt.
Nepeta glechomæ	M. pericæ Sulz.
Nerium oleander	M. persicæ Sulz.
Oxalis sp.	M. circumflexus Buck.
Orchis sp.	M. circumflexus Buck.
Poa annua	M. longipennis Buck.
Polygonum persicariæ	M. polygoni Buck.
Portulaca oleracea	M. persicæ Sulz.
Picea excelsa	M. piceælla Theob.
Primula vulgaris, etc.	M. primulæ Theob.
Primula vulgaris	M. polyanthi sp. nov.
Polyanthus	M. polyanthi sp. nov.
Pyrus germanica	M. mespili V. d. Goot.
Ribes spp.	M. lactucæ Schrk.
Ranunculus sp.	M. ranunculinus Wlk.
Sambucus nigra	M. impactus Wlk.
Solanum tuberosum	M. pseudosolani Theob.
Sanguisorba officinalis	M. persicæ Sulz.
Senecio vulgaris	M. persicæ Sulz.
Spiræa sp.	M. circumflexus Buck.
Schizanthus sp.	M. circumflexus Buck.
Sonchus oleraceus	M. lactucæ Schrk.
Tulipa spp.	M. duffieldii Theob.
,, ,,	M. circumflexus Buck.
Urtica piluliferæ	M. persicæ Sulz.
,, *urens*	M. persicæ Sulz.
Vaccinium vitis-idæa	M. vaccinii Theo.
Vinca major	M. convolvuli Kalt.
,, ,,	M. circumflexus Buck.
,, *minor*	M. convolvuli Kalt.
Veronica beccabunga	M. veronicellus Theob.
Valeriana pyrenica	M. persicæ Sulz.

There are many more host plants of *M. persicæ*.

KEY TO BRITISH *Myzus.*

Alate females.

A. Black, abdomen deep blackish green to black.

a. Cornicles diverging ; non-reticulate.

Antennal segment iii. with 18 to 25 sensoria ; iv. longer than v. Cauda one-third of cornicles *cerasi* Fabr.

Antennal segment iii. with 12 to 14 sensoria ; iv. as long as v. ; cauda half cornicles. *galiifolium* Theob.

aa. Cornicles converging.

Cauda one-third cornicles. *mollugInis* Koch.

B. Black head and thorax, body green or yellow.

b. Cornicles reticulate at apices.

c. Abdomen deep green only.

Segment iii. of antennæ with 18 sensoria ; iv. a little longer than v. *mollugInellus* Theob.

cc. Abdomen ornate.

d. Cornicles black.

Abdomen shiny green to yellowish ; 2 dark basal patches on segments ii. to iv. ; v. and vi. with 2 small patches close together ; 3 large black lateral spots and traces of a fourth basally. Cornicles long, thin ; iii. with 35 to 45 sensoria. *lactucæ* Schr.

Abdomen green, with dark lateral spots and traces of dark lateral marks ; iii. with 13 to 15 sensoria. *laricellus* Theob.

dd. Cornicles deep brown, deep green to black.

Abdomen green, with 5 interrupted black bands and traces of a sixth ; 3 pairs of black lateral spots ; iii. with 24 to 36 scattered sensoria. *hieracii* Kalt.

ddd. Cornicles pale green or yellow, apices dark.

Abdomen green to yellow-green, with 4 long transverse dark bars laterally and below each a dark spot ; iii. with 11 sensoria. *aquilegiæ* Theob.

Pale green ; 2 pairs of lateral spots basally, double black bars between cornicles ; 4 pairs of black lateral spots, 1 at base of cornicles, 2 more apical ; iii. with 10 to 14 sensoria. *duffieldii* Theob.

Abdomen green, with black transverse bars and dark lateral spots ; iii. with 14 to 23 sensoria. *pseudosolani* Theob.

Abdomen green, with 4 black lateral spots; iii. with 10 sensoria. *piceællus* Theob.

bb. Cornicles with no reticulation.

f. Cornicles swollen, dark.

Abdomen green, yellow or pink, with large black irregular dorsal patch and some cross lines ; iii. with 14 to 24 sensoria in a line ; 3 hairs each side of cauda. *persicæ* Sulz.

Similar, but smaller and more fragile, with 2 hairs each side of cauda. *vaccinii* Theob.

ff. Cornicles cylindrical.

g. Cornicles black.

Yellowish to green ; 4 to 5 broken transverse bands ; 3 large dark spots at sides of bands, and smaller marginal ones. *polygoni* Buck.

gg. Cornicles olive-green to dusky.

Green ; a dark median abdominal area and dark lateral spots. Cornicles deep olive-green ; iii. with 10 sensoria ; cauda one-quarter cornicles. *glaucii* Theob.

Abdomen green to yellow, with a large dark, irregular U-shaped area and a small dark area in front and behind ; iii. with 15 to 20 sensoria. *circumflexus* Buck.

ggg. Cornicles pale green to green.

Green body, black spots each side ; iii. with 15 to 20 sensoria. *festucæ* Theob.

Bright green, with small black, irregular dorsal patch, 4 broken cross lines ; 3 large black lateral spots ; iii. with 14 to 18 sensoria. *convolvuli* Kalt.

Apple-green to pale yellow-green ; cornicles yellow-green to pale brown ; 3 black transverse bars and 2 caudad, more or less fused at sides ; iii. with 35 to 40 sensoria. *primulæ* Theob.

Similar, but with 10 to 17 sensoria and much paler in colour. *polyanthi* sp. nov.

Pale green, with faint cross-stripes of brown. *gracilis* Buck.

Yellow-brown ; a dark median area and black lateral spots. Cornicles dull yellow ; iii. with 9 to 11 sensoria. *impactus* Wlk.

Abdomen green, with dark median and lateral areas ; iii. with 11 to 14 sensoria. *lythri* Schr.

Abdomen light green in front, yellow to orange behind, and irregular dark green lateral spots. *pseudolamii* Theob.

ccc. Abdomen not ornate.

Thorax and head brown ; abdomen all green. Cauda and cornicles yellowish. Cauda one-third of cornicles. Rostrum to second coxæ ; iii. with 6 to 8 sensoria. *chelidonii* Kalt.

Thorax pale yellow-brown ; abdomen light green ; cornicles green, thin, apices dark ; iii. with 11 sensoria. Rostrum to second coxæ. *veronicellus* Theob.

Thorax and body green. Cornicles all green ; iii. with 11 to 14 sensoria ; cauda 4 hairs one side, 3 the other. *neogei* Theob.

Apterous females.

A. Black.

a. Cornicles diverging, non-reticulate.

Cauda, apical hairs, numerous, curved. *cerasi* F.

Cauda, 3 hairs only each side. *galiifolium* Theob.

aa. Cornicles diverging. *mollugìnis* Koch.

B. Green of various shades.

b. Body ornate.

c. Cornicles reticulate.

Green ; 5 to 7 dark lateral spots ; cornicles yellow ; segment iii. with many sensoria. *lactucæ* Schr.

Green to citron yellow, with pale or dark mottlings ; cornicles pale ; segment iii. with 1 sensorium ; dark lateral spots. *aquilegiæ* Theob.

Unknown. *mollugìnellus* Theob.

cc. Cornicles with very few apical reticulations or striæ.

Head, thorax and body brown, with some green bands, etc., on head, thorax and apex of body. Cornicles deep green ; iii. of antennæ with 11 to 15 sensoria, base rather swollen. *hieracii* Kalt.

Head fawn to pale olive, body pale apple-green, darker posteriorly, a yellow area at base of cornicles. Cornicles pale yellow. Segment iii. with 1 sensorium. *duffieldii* Theob.

bb. Body not ornate.

Cornicles green.

Pale yellow. Antennæ not quite so long as body; segment iii. with 3 to 5 sensoria at base. Rostrum to second coxæ. *ranunculinus* Wlk.

Pale yellow-green to green, often rusty at base of cornicles; antennæ as long as or longer than body; iii. with 0 to 2 sensoria; cornicles with 3 apical striæ. Rostrum to 2nd coxæ. *pseudosolani* Theob.

cc. Cornicles with no reticulation.

e. Cornicles swollen.

Green, yellow, pale pink. Antennæ shorter than body; iii. with no sensoria. Cornicles same colour as body. Rostrum just past second coxæ. Cauda one-third cornicles. Cauda 3 hairs each side *persicæ* Sulzer.

Green; iii. with 1 sensorium. Rostrum to third coxæ. Cauda one-half cornicles; 2 hairs each side of cauda. *vaccinii* Theob.

ee. Cornicles cylindrical.

f. Cornicles black.

Pale yellow. *polygoni* Buck.

ff. Cornicles yellow or green.

g. Abdomen ornate.

Shiny yellow-green; 1 to 2 dots each side of thorax. Body with dark patches, one an irregular horse-shoe shape; iii. with 1 sensorium. Cornicles green of moderate length. *circumflexus* Buck.

Pale translucent green to apple-green with deeper dorsal green marks; iii. with 1 to 2 sensoria. Rostrum to third coxæ. Cornicles translucent. *hydrocotylei* Theob.

Green, rusty red marks at base of cornicles and posterior of body; iii. with 1 to 3 sensoria. Rostrum to second coxæ. *convolvuli* Kalt.

gg. Abdomen not ornate.

h. Green; iii. with 3 to 5 sensoria. Rostrum to second coxæ. *impactus* Wlk.

Green; iii. with 2 projecting sensoria. Cornicles long and thin. Cauda one-third of cornicles. Rostrum past second coxæ. *glaucii* Theob.

Pale green. Antennæ longer than body; iii. with 1 sensorium. Cornicles green, long, thin. Cauda half cornicles, hairs 3 and 3. *mercurialis* Theob.

Green; cornicles pale green; iii. with 0 to 3 sensoria. Cauda one-third cornicles, hairs 2 and 2. *chelidonii* Kalt.

Bright green; rostrum broad, short, not reaching second coxæ; iii. with 1 sensorium. Cauda half cornicles. *myrmecophilus* Theob.

hh. Brownish-green; head shiny and paler than body. Cauda half cornicles, hairs 2 and 2. *veronicellus* Theob.

hhh. Yellow to pinkish-green; cornicles and cauda green; iii. with 2 sensoria. Cauda half cornicles. *festucæ* Theob.

Pale yellow; shiny, some yellowish-green; iii. with 5 to 8 sensoria. Some black spots on body. *primulæ* Theob.

Pale yellow, similar to *primulæ* but iii. has 1 to 2 sensoria. *polyanthi* sp. nov.

Pale yellowish-green to almost white, delicate. Antennæ longer than body. Cornicles pallid. Cauda about two-thirds of cornicles. Rostrum to third coxæ. *eupatorii* Pass.

Yellow to yellow-green, marked with rusty red; iii. with 1 to 2 sensoria. *longipennis* Buck.

MYZUS CERASI Fabricius.

Aphis cerasi Fabricius.
Aphis asperulæ Walker.
Aphis euphrasiæ Walker.
Aphis aparines Kaltenbach.
Aphis prunicola Kaltenbach.
Myzus cerasi Passerini.
Cerasaphis Amyot.

Fabricius, Syst. Ent., 734 (1775); Sp. Ins., II., 3845 (1781); Ent. Syst., III., 211, 7 (1793); Syst. Rhyng., 295, 6 (1803); Schrank, Fn. Boica, II., 115, 1218 (1801); Walker, Zoologist, VI., 2248 (1848) (=*asperulæ*); Walker, Zoologist, VII., 51, App. (1849) (=*euphrasiæ*); Fonscolombe, Ann. Soc. Ent. Fr., X., 179, 12 (1872); Mosley, Gard. Chron., I., 628 (1841); Kaltenbach, Mono. Pflanz., I., 45, 31 (1843); Walker, Ann. Nat. Hist. Se. 2, IV., 43, 68 (1847); Amyot, Ann. Soc. Ent. Fr., Se. 2. V., 477; Walker, List. Homop. (B.M.), IV., 978, 76 (1852); Koch, Die

Pflanz, 87, 28, figs. 115, 116, (1855); Buckton, Mono. Brit. Aphid., I., 174, pl. XXVIII. (1875); Passerini, Aphid. Ital., 21, 22 (1863); Ferrari, Ann. d. Mus. Civ. Stor. Nat. d. Genova, II., 61, 28 (1872); Schouteden, Mém. Soc. Ent. Belg., XII., 231, 3 (1906); Fitch, Cat. Homop., N.Y., 1851 (Lintner's 9th Rept. Ent., N.Y., 405); Thomas, Ent. Ill. Rept., VIII., 75 (1880); Oestlund, Aphid. Minn., 73 (1887); Weed, Bull. Ohio Exp. Sta. Tec., Se. V., 1, 2 (1890); Theobald, Rept. Eco. Zool., 48 (1908); Insect Pests of Fruit, 197 (1909); Gillette, Journ. Eco. Ent., I., 362, pl. 8, figs. 1-3 (1908); Gillette & Taylor, Agri. Exp. Sta. Col. Agri. Coll. Bull. 132, 42, pl. II., figs. 1-4 (1908); Quaintance & Baker, Farmer's Bull., U.S.A., Dept. Agri., 804, 24; Gillette, Mo. Bull. State. Com. Horti., California, VI., 2, 63; Ross, Canad. Entomo., XLIX., 434 (1917); Agri. Gazette Canad., V., 1, 13-16 (1918); Wimshurst, Bull. Ent. Res., XVI., pl. I., 85-94, figs. 6 (1925).

Apterous viviparous female (Fundatrix) on Cherry. Shiny black above, reddish-brown between thoracic segments and on venter, more or less globose, in some slightly elongate. Cornicles black, cylindrical, slightly tapering apically, constricted at apex, a little longer than antennal segment iii. Cauda black, conical, with several hairs. Anal plate dark, with several long hairs. Antennæ less than half of body, of 5 segments; dark, except iii. which is paler coloured; i. slightly longer than ii.; iii. longest; iv. about half of v.; now and then a sensorium on iii., the normal ones on iv. and v. Legs dark, except tibiæ and base of femora, which are pale ochreous to pale brown.

Length. 2.2 to 2.5 mm.

Apterous viviparous female (virgogenia). Black, either shiny or sooty black, often of a gummy appearance; more or less globose; antennæ shorter than body; segments i. and ii. dark; iii. to v. except apices pale ochreous to yellow; apices of v. and vi. dark; i. larger than ii.; iii. longer than iv.; iv. a little longer than v.; vi. about as long as iv. + v. to a little longer; antennæ arise from well-marked porrected frontal processes. Eyes dark. Rostrum to base of second coxæ. Cornicles black, long, cylindrical but somewhat constricted at apices, a little longer than antennal segment iii. Cauda black, much shorter than cornicles (0.17, cornicles 0.57 to 0.59), with a few apical curved hairs. Legs rather

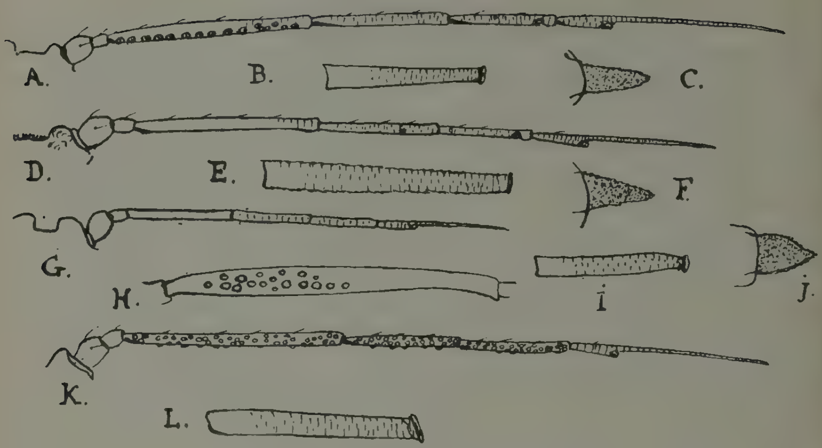

Fig. 151.—*Myzus cerasi* Fabricius.

A. Head and antenna of alate ♀; B. Cornicle; C. Cauda; D. Head and antenna of apterous ♀; E. Cornicle; F. Cauda; G. Head and antenna of oviparous ♀; I. Cornicle; J. Cauda; K. Antenna of male; L. Cornicle.

short and thick; femora dark, especially of second and third legs; fore pair often pallid; tibiæ pale, except at apices; tarsi dark; a few hairs on femora, many on tibiæ. A small tubercle each side of pronotum and two between hind legs and tip of abdomen.

Length 1.8 to 2 mm.

Alate viviparous female (on Cherry). Black, shiny; brownish below. Legs dusky black, except tibiæ and base of femora which are yellowish to pallid brown. Antennæ not quite so long as body to nearly the same length; black, except base of segment iii.; i. and ii. about equal, but i broader than ii.; iii. longer than iv.; iv. a little longer than v.; iii. with 14 to 22 sensoria along the whole of one side, but irregularly arranged; base of vi. rather less than one-third of flagellum; vi. a little longer than iii. Small lateral pronotal tubercles. Cornicles black, thin, cylindrical, rather long, imbricate, about as long as antennal segment iv. Cauda black, bluntly acuminate, about as long as hind tarsus, with several curved hairs. Anal plate dark, oval to quadrate with several hairs. Eyes deep red. Stigma of wings dusky brown.

Length 1.7 to 2 mm.

Apterous viviparous female (on Galium, etc.). Colour varying from dark brown to green, pale yellow, reddish-brown to dirty reddish-green, paler beneath, in some the venter is red, in others reddish-green, some are cinnamon all over ; shiny ; convex and some dark markings on the abdomen. Head dusky. Antennæ pale brown ; segment vi. dark and often i. ; ii. olive-green to deep brown ; about half length of body ; i. larger than ii. ; iii. longer than iv., a little shorter than flagellum of vi. ; iv. and v. equal ; base of vi. about two-thirds of v. ; sensoria normal on v. and vi. Rostrum broad, reaching to second coxæ. Cornicles deep brown to black, as long as segment vi. of antennæ, cylindrical, somewhat enlarged basally and slightly curved outwards at apices, a few apical striæ, almost becoming reticulate in some specimens. Cauda less than one-third of the cornicles, with 2 or more hairs each side. A few scattered hairs on body. Eyes red. Frontal porrected lobes as in previous form. Base of antennæ and head granulate.

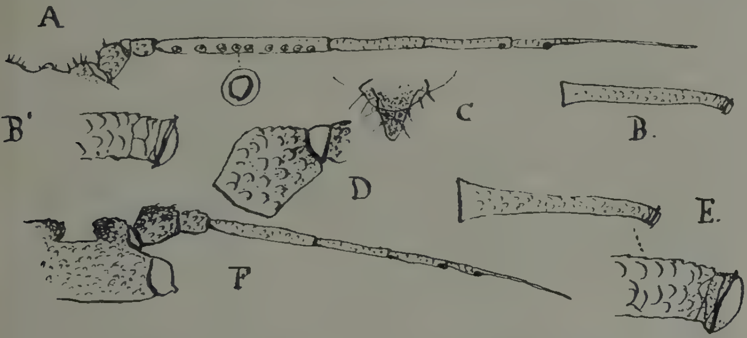

Fig. 152.—*Myzus cerasi*, race, *asperulæ* Walker.
A. Head and antenna ; B. Cornicle ; B^1, Apex further enlarged ; C. Cauda ; D. Segment I. of antenna of alate ♀; E.F. of apterous ♀.

Length 1.3 to 1.8 mm.

Alate viviparous female (return Migrant). On *Galium*, *Asperula*, etc. Reddish-brown of various shades to green with dark dorsal markings, especially a large dark irregular dorsal patch, much broken up and dark lateral patches and small round dark spots between the former and the latter ; these are very variable in form and size, according to the host plant. Antennæ dusky ; segment i. larger than ii. ; iii. much longer than iv., and about as long as vi. with 7 to 12 round sensoria, reaching nearly to apex ; iv. and v. equal ; vi. with basal area about quarter length of flagellum. Cornicles black, not quite so long as antennal segment iii. cylindrical, and slightly curved at their tips, one branched and one straight stria at apices. Anal plate and cauda black, the latter with 2 or more hairs each side; not half the length of cornicles. Anal plate with 6 or more marked hairs. Legs much the same colour as body, but often yellow; apices of tibiæ and the tarsi black; often a small dark area at apices of fore femora, mid and hind femora with large black apical areas. Rostrum same colour as body, apex dark, reaching to about third coxæ. Wings normal; stigma and insertions yellowish, the latter often brown; veins brown.

Length 1.3 to 1.7 mm.

Male. Alate. Black, in some the abdomen is deep brown, paler than head and thorax, often showing transverse dark bars. Head deep black. Eyes red. Antennæ black, longer than body; segment i. wider, but same length as ii.; iii. much longer than iv.; iv. slightly longer than v.; vi. not quite so long as iii. + iv., flagellum rather long, iii. to v. slightly enlarged with many sensoria, iii. with 40 to 50; iv. with 30 to 40; v. with 20 to 30. Small lateral pronotal papillæ. Rostrum to about second coxæ. Legs moderately long and thin, black, except base of femora and tibiæ which are yellow to pale brown. Cornicles black, long, thin, cylindrical, imbricate, a little longer than antennal segment iv. Cauda black, acuminate, about quarter of cornicles. Wings large, nervures and stigma brown. Penis pale, claspers dark.

Length 1.2 to 1.7 mm.

Oviparous female. Apterous; green, greenish-brown, ochreous-brown to dull brown; globose to oval. Head darker than rest of body. Cornicles, cauda and most of legs dark. Antennæ shorter than body, arising from prominent frontal tubercles; segment i. longer than ii.; iii. longer than iv.; iv. and v. equal; vi. a little shorter than iv. + v., basal area not one-third the flagellum. Rostrum rather thick and broad, reaching to second coxæ. Cornicles rather long, cylindrical, about as long as segment vi. of antennæ and about as long as hind femora. Cauda and anal plate black; former triangulate with a few scattered hairs, much shorter than cornicles. Legs rather short and thick; hind tibiæ with many sensoria on the enlarged basal area.

Length 1 to 1.6 mm.

FOOD PLANTS. Cherry (*Cerasus vulgaris*); cleavers (*Galium aparine*) and *Galium cruciatum, Galium spp.*; Woodruff, *Asperula odorata*; Eyebright (*Euphrasia officinalis*); *Lepidium spp.* in America; Black Currant (*Ribes nigrum*)? Buckton. It has also been recorded from Peach, but the records probably apply to the dark form of *A. amygdali* Buckton.

LOCALITIES. A cosmopolitan species, often very harmful to sweet and sour cherries. Europe, S. Africa, N. America, Australia and New Zealand.

Observations. The Cherry Black Fly clusters on the top of the shoots in dense sticky masses, and curls the leaves, often into close tufts and also deforms the shoots. Older leaves are also attacked. It produces much sticky honey-dew, which is caustic in nature and burns up the foliage and falls on the fruit and ruins it as well. On the sweet excrement the black soot fungus finds a ready seed-bed and aids in the disfigurement of leafage and fruit. The sexuales occur on the Cherry and there the oviparous females lay their eggs. These eggs may be found from November to the end of February. The ova are laid in various places, some near the buds, others on the wood. Most, as Miss Wimshurst describes, are placed amongst the scales, just below the cherry buds. Some I have found laid on the trunk near the ground, and others on suckers from the wild cherries. At first the ova are yellowish-green, but soon become shiny black. These eggs hatch out in March, and by April mature Stem-Mothers, or Fundatrices appear. During May generations of wingless females are produced, and in June some become alate, in July many more alatæ occur; these fly away and settle on other plants such as the Bedstraws (*Galium*); Woodruff (*Asperula odorata*); Eyebright (*Euphrasia officinalis*) and in Canada and N. America on *Lepidium spp.* Whilst the majority migrate to the herbaceous plants mentioned, a few feeble colonies, as shown by Miss Wimshurst, persist on the Cherries, and in September any wingless females still left on the cherries produce alate females, which remain on the Cherries. The alatæ which leave the cherries in June produce wingless females on *Galium*, etc., and those coming from the Cherries in July do likewise. In August we get mainly apteræ on *Galium*, etc., but in September the apteræ produce alatæ and these fly back to the Cherry and there give rise to the oviparous wingless females. In October the remaining apteræ on the *Galium* produce winged males and these fly to the Cherries and copulate with the oviparous females, and by the end of October the latter commence to lay their fertilised eggs. The *Galium* alternate host was traced by Miss Wimshurst. Specimens of an Aphid sent me by Mr. Dallman from *Asperula odorata* in 1925 were named *Myzus asperulæ* Walker ; these were sent to Mr. F. Laing, and he found they agreed with Walker's *asperulæ*, but queried if they were not *cerasi*. There is not the least doubt they are, now I have compared them with some of Miss Wimshurst's *cerasi* from *Galium*. Walker's *Aphis euphrasiæ* from the Eye-bright (*Euphrasia officinalis*) is also clearly a small form of the same. The types of both these species are still in the British Museum. In Canada and U.S.A. the Cherry Black Fly has been traced to *Lepidium spp*. This was suggested by Gillette and conclusively proved by Ross in his valuable paper in the Agricultural Gazette of Canada (Vol. 5, pp. 13-16, 1918). He explains the life-cycle in Canada as follows : " The minute ova are laid around buds and on rough bark of twigs and branches of the cherry in autumn, and hatch in early spring, before the buds burst and are swelling. All the eggs hatched at least nineteen days before the buds burst. The 'stem mothers' move to the buds and feed on the green tissues. Later on they attack the tender leaves and blossom buds and become mature in four to five weeks, and then within a day or two give rise to living young. These develop into the wingless forms and this generation is followed by brood after brood of apterous and alate females. The alatæ migrate to another host plant, the apteræ remain and may be found on the cherry from spring to autumn. The alatæ develop from mid-June to mid or late August, and these migrate to the Wild Pepper Grass (*Lepidium apetalum*) and produce colonies of apteræ. In early autumn the return alate migrants arise on the Pepper Grass and fly to the Cherry, where they give rise to the oviparous females, and at the same time on the Cherry alate forms occur which also produce oviparous females." Thus sexuales are formed in Canada as shown by Miss Wimshurst here on both primary and secondary hosts. In Canada the alate males appear on *Lepidium* and fly off to the Cherries, just as Miss Wimshurst has shown here they do on *Galium*. At present no males have been found to be produced on he Cherry. If this is so the continuance of the life-cycle depends on the existence of a secondary host plant.

Natural Enemies. Miss Wimshurst has found the following natural enemies: (1) On Cherry: Coccinellids and their larvæ; Syrphid larvæ; the following Braconidæ, *Ephedrus lacertosus* Hal., and 3 species of *Aphidius*; Prototrypidæ, *Lygocerus aphidivorus* Kieff; (2) on *Galium aparine*, very young spiders of the family *Epeiridæ*; immature Anthocoris bugs, sp? Braconidæ: *Ephedrus lacertosus* Hal.; *Trionys brevicornis* Hal.; *Aphidius cerasi* Marsh; Cynipidæ, *Allotria flavecornis* Hts.; Proctotrypidæ, *Lygocerus aphidivorus* Kieff.

MYZUS GALIIFOLIUM Theobald.

Entomologist, LII., 158 (1919).

Alate viviparous female. Generally resembling *Pergandeida galii* of Kaltenbach in colour, but with long cornicles. Antennæ dark, except base of segment iii. Cornicles and cauda black. Tibiæ pale, except apices. Antennæ nearly as long as body; segment i. much larger than ii.; iii. longer than iv., but not so long as vi., with 11 to 14 sensoria along its whole length; iv. as long as v.; vi. as long as or a little longer than iv. + v.; basal area nearly half length of v.; the flagellum four times as long as basal area. Cornicles slightly longer and much broader than antennal segment v., cylindrical, slightly expanding basally, in some they are the

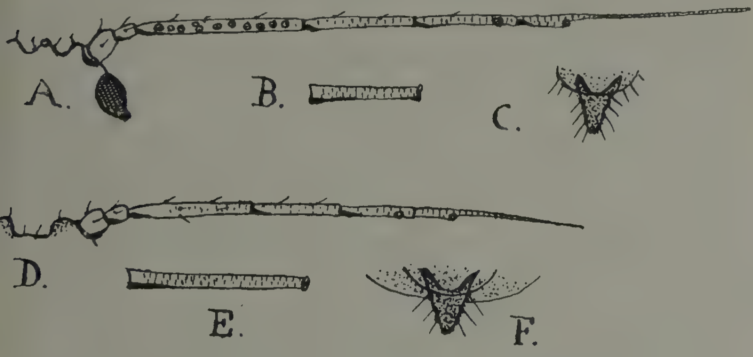

Fig. 153.—*Myzus galiifolium* Theobald.
. Head and antenna of alate ♀; B. Cornicle; C. Cauda; D. Antenna and head of apterous ♀; E. Cornicle; F. Cauda.

same length; imbricated. Cauda about half length of cornicles, acuminate, base broad, 4 hairs each side. Anal plate black. Second cubital cell of wing with stem as long as the cell, to not quite so long.

Length 1.9 to 2 mm.

Apterous viviparous female. Similar to *P. galii* in colour, but with much longer cornicles. Antennæ shorter than body. Cornicles black, longer than antennal segment iii. Cauda black; one-fourth or less the length of cornicles. Antennal segment i. longer and wider than ii.; iii. longer than iv., but not so long as vi.; iv. longer than v.; vi. about as long as iv. + v., basal area half length of v. and not quite quarter of the flagellum; v. and vi. black. Cornicles thicker than antennæ, but thinner than cauda, imbricated. Cauda broad at base, narrowed to apex, which is blunt; 3 hairs each side. Eyes black, rather small. Legs moderately long and thick, brownish-yellow; tarsi dark and to some extent also apices of tibiæ and femora.

Length 1.5 to 1.7 mm.

FOOD PLANT. Bedstraw (*Galium cruciatum*).

LOCALITIES. Stouting, near Hythe, Kent, and Wye, 23 v. and 1 to 10 vi. 1913 (Duffield); Yarmouth, Isle of Wight, 1 vii. 15 (F.V.T.).

Observations. This species bears a general resemblance in colour to Kaltenbach's *Aphis galii*, which is a *Pergandeida*, but can at once be demarked by its long cornicles. It lives in dense clusters on the top of the shoots, both on the stem and under and on the leaves, and even in the flower heads. I have not noticed any deformation caused by it, nor any appreciable damage done. The colour varies from almost black to deep dusky or clayey-brown. From the shiny black *A. molluginis* Koch, it may be told by its long cornicles, especially in the apteræ diverging and not markedly converging, as in that species, which feeds on *Galium mollugo*. Kaltenbach's *Aphis aparines* is the same as *cerasi*. *Myzus molluginellus* has the cornicles reticulate at the apices. Del Guercio describes an Aphis—*Aphis erecta*—on *Galium erectum* from Portugal, the apterous female being dark green and pear-shaped, the alate female with 4 sensoria on the terminal third of antennal segment iii. and another species, *Aphis phlomoidea*, which is green like *A. erecta*, but with ringed antennæ in the alate female and three rows of sensoria on antennal segment iii., moreover the cornicles in the apteræ are barely longer than the cauda, which points to its being a *Pergandeida*. It resembles in many ways *cerasi*, but its dark, almost black, colour on the *Galium* at once demarks it. Kaltenbach's *aparines* is usually looked upon as *rumicis*. I think it is *cerasi*.

MYZUS MOLLUGINIS Koch.

Aphis mollugínis Koch.

Koch, Die Pflanz, 88 (1854).

Apterous viviparous female. Black and shiny, the legs, yellow, except for the dark tarsi. Antennæ yellow, black at base and apex, a little more than half length of body, arising from marked porrected frontal tubercles; segment i. much larger than ii.; iii. a very little longer than iv. or v., the two latter nearly equal; vi. about as long as iv. + v.; basal area nearly half as long as flagellum. Rostrum reaching nearly to third coxæ. Cornicles long, black, cylindrical, rather thin, constricted near apex, markedly imbricate, about as long as antennal segments iii. and iv., in some curved inwards. Cauda dark, small, less than one-third length of cornicles, bluntly triangulate, spinose with 2 hairs each side and 2 sub-apical ones. Femora and tibiæ with a few faint fine hairs. Frontal lobes and the skin, except apically, where it is finely spinose, much corrugated.

Length 1.4 to 1.6 mm.

Alate viviparous female. Black. Antennæ longer and cornicles shorter than in apteræ and the cauda longer. Colour of legs, etc., the same.

FOOD PLANT. *Galium mollugo* and *Galium sp.*

LOCALITIES. Northop, Flintshire, vii. 23 (Walton); Wye, Kent, vii. 09 (F.V.T.).

Observations. I have only seen apteræ and they differ from other Galium species very markedly, especially in the rather peculiar shaped, narrow cornicles. In most the latter turn inwards as figured by Koch, but not in all. It becomes alate in August, for a few received in July were nymphæ.

Myzus molluginellus Theobald.

Ent. Mo. Mag., vol. LX., p. 128, fig. 6 (1924).

Alate viviparous female. Head and thorax dark. Abdomen very deep green. Cornicles deep brown to almost black. Cauda pale. Antennæ dark, especially basally and apically to some extent, about as long as body. Legs same colour as body, with broad dark apices to femora and tibiæ ; tarsi dark. Segment i. of antennæ much larger than ii. ; iii. much longer than iv., with a line of about 18 sensoria on one side and some hairs on the other ; iv. a little longer than v. ; v. with normal sub-apical sensorium ; vi. much longer than iii., basal area one-quarter of v. Rostrum reaching to second coxæ. A few hairs on head. Cornicles long, cylindrical, apex with large reticulations, remainder imbricated, not quite so long to same length as antennal segment iii. Cauda pale, blunt, thicker than cornicles, about one-third their length, spinose, with three hairs each side. Femora and tibiæ with numerous hairs. Abdomen with scanty hairs.

Length 2.5 to 2.8 mm

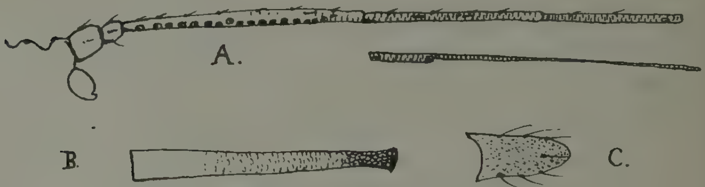

Fig. 154.—*Myzus molluginellus* Theobald.
A. head and antenna of alate ♀; B. cornicle; C. cauda.

Food Plant. *Galium* sp.

Locality. Northop, Flintshire, vii. 23 (C. L. Walton).

Observations. Described from fresh spirit specimens taken in company with *Myzus mollugini*s Koch, from which it can easily be distinguished by its much larger cornicles, reticulate at apices, and larger size.

Myzus lactucæ Schrank (non Fabr.).

Aphis lactucæ Schrank.
Aphis ribicola Kaltenbach.
Siphonophora ribicola Koch.
Siphonophora lactucæ Buckton.

Aphis ribis Frisch.
Aphis ribis-nigra Mosley.
Macrosiphum lactucæ Schouteden.

Schrank, Fn. Boica, II., 120, 1233 (1801); Reaumur Ins., III., pl. 22, figs, 3 to 5 (1737); Fabricius, Sp. Ins., II., 309, 47 (1781); Rossi, Fn. Etrusca. 264, 1401 (1790); Fabricius, Ent. Syst., IV., 1220, 521 (1794); Syst. Rhyng., 301, 52 (1803); Boyer, Ann. Soc. Ent. Fr., V., 170, 10 (1841); Kaltenbach, Mono. Pflanz., 33 (1843); Mosley, Gard. Chron. 1, 684 (1841); Passerini, Gli Afidi, 34 (1860); Koch, Die Pflanz. 195, figs. 267, 268 (1855); Buckton, Mono. Brit. Aphid., I., 139, pl. XVI. (1875); Schouteden, Mém. Soc. Ent. Belg., XII., 239, 13 (1906); Theobald, Journ. Eco. Biol., VII., 162, pl. III., fig. 1 (1913); Patch, Bull. 225, Maine Agri. Exp. Sta., 57, figs. 21-27 (1914); Davis, Journ. Eco. Ent., IV., 329, pl. X., figs. 7-11 (1911).

Alate viviparous female (on Ribes). Thorax shiny black, a green line on each side spreading out posteriorly; pronotum green with two black spots. Head green, darkened in front. Eyes deep red to black. Antennæ dark; longer than body; iii. with 35 to 45 sensoria spreading over whole length; iv. with 7 to 14 sensoria, mainly along one side; some of the hairs capitate. Abdomen shiny green to yellowish-green; segments ii. to iv. with two dark basal patches; v. and vi. each with two small

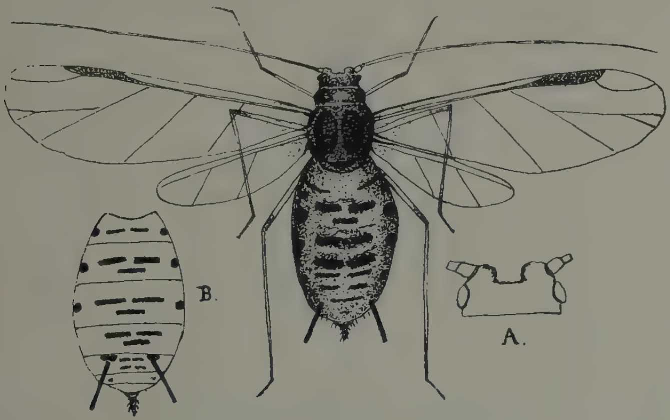

Fig. 155.—*Myzus lactucæ* Schrank.
Alate viviparous female from currant. A. head; B. abdomen of lettuce form.

patches closer together; in some there are dark markings further back; three large black lateral spots and traces of a fourth one basally. Cornicles long, thin, cylindrical, black, often paler at apex, which is reticulate. Cauda dark brown, moderately long, blunt. Wings with yellowish-brown stigma. Legs green to yellowish-green, apical half of femora, apices of tibiæ and the tarsi dark; femora and tibiæ hairy.

Length 2 to 2.5 mm.

Apterous viviparous female (on Ribes). Green and shiny. Eyes red. Antennæ green, apices of segments iv. and v. dusky; vi. dusky, especially at base and apex; iii. often with one basal sensorium. Abdomen with 5 to 7 slightly darker lateral spots. Cornicles long, yellow, slightly dusky at apices, which are reticulate: remainder imbricated. Legs yellowish-green; tarsi dark.

Length 2 to 2.5 mm.

Apterous viviparous female (on Lettuce). Yellowish-green to bright-green. Abdomen with 7 pairs of dark lateral spots,

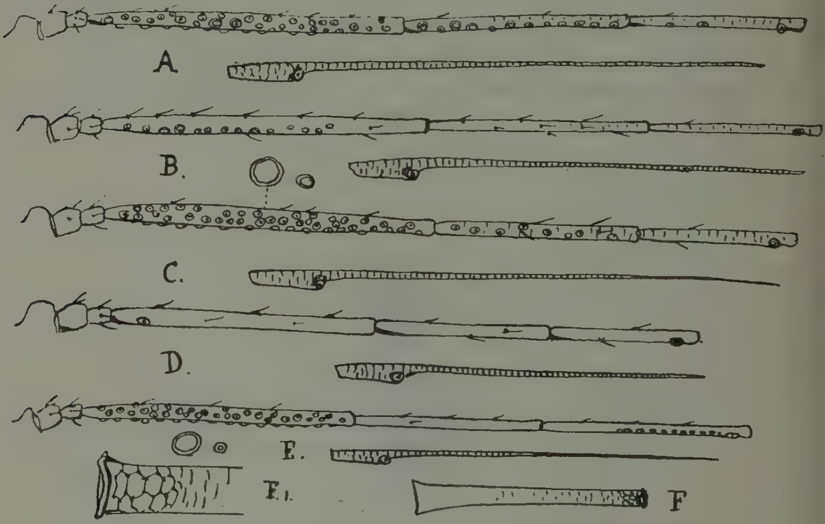

Fig. 156.—*Myzus lactucæ* Schrank.
A. Antenna of alate viviparous ♀ from *Sonchus*; B. Antenna of apterous viviparous ♀ from *Sonchus*; C. Antenna of alate ♀ from *Ribes*; D. Antenna of apterous ♀ from *Ribes*; E. Antenna of male from *Ribes*; F. Cornicle; F.1. Cornicle apex further enlarged.

wrinkled and shiny. Antennæ longer than body; segment iii. with 25 to 35 sensoria, most numerous on basal half; i. dusky; ii. to v. pale green; apices of iii. to v. dusky; vi. dusky, but paler in middle; hairs minutely capitate; some capitate hairs on body and head. Cauda yellowish. Cornicles yellowish, apices dusky and reticulate. Legs yellowish-green to green, apices of femora dusky, a broad dark apical band to tibiæ; tarsi dark.

Alate viviparous female (on Lettuce). Head and thorax dark brown to black, shiny. Eyes dark red. Antennæ dark brown, longer than body; segment iii. with 29 to 42 sensoria over nearly whole surface; iv. with 11 to 14 sensoria; v. with 0 to 5; hairs slightly capitate. Abdomen green with 5 to 7 irregular dark broken bands and 4 large dark lateral spots; apex and cauda dusky. Cornicles dark brown, pale and reticulate apically, long. Legs ochre-yellow, apical half of femora, apices of tibiæ and the tarsi dusky. Wing insertions yellow; stigma brown.

Length 2.5 mm.

Male. Alate. Antennæ longer than body; segment iii. longer than iv., not quite so long as v.; iii. with 33 to 47 sensoria of two sizes over whole length and 16 showing on one side near base; v. with 9 to 11 along one side of apical half. Cornicles narrow, bases expanded, not so long as antennal segment iii., a few large apical reticulations. Rostrum reaching to between second and third coxæ. Claspers dark. Penis dark.

Length 2 mm.

FOOD PLANTS. All varieties of *Ribes*; Lettuce and Endives (*Lactuca spp.*); Sowthistles (*Sonchus oleraceus*); *Crepis viridis*; *Cnicus arvensis*; *Lapsana communis* (Walker).

LOCALITIES. All over Great Britain, especially the South, S.E. and West; not so abundant in Scotland or Ireland; more or less common in Wales, France, Italy, Belgium and Norway (F.V.T.).

Observations. An abundant and often very harmful species on Lettuces and Endives and now and then on Currants and other *Ribes*. It occurs on the various *Ribes* up to June, and a few may be found up to the first week in July in the South of England. The earliest alate females I have found were on May 12th, in 1914, on Gooseberries. When they become winged they fly off to lettuces, endives, sow-thistles, *Crepis*, etc., and feed there until the autumn, when they return to the *Ribes* and there the sexual broods are to be found. In some years I have found a few alatæ on lettuces as late as December 3rd. The oviparous females are as plentiful on fallen leaves as on the bushes. The eggs are laid anywhere on the shoots, and now and then on fallen leaves. Males and females have been found on *Ribes* as early as the end of August, which is certainly abnormal. This Aphid curls up the leaves of the top shoots of currants to some extent, more so on the Gooseberry. The migration spreads over a very long period, from the *Ribes* to the annual plants, extending from May to early July. The damage done to lettuces is far more serious than that done to *Ribes*, and I have known large "platts" of commercial lettuce ruined by this "Dolphin." Buckton (pl. XVI., fig. 5) shows the alate female with black cornicles, but in his description says: "Cornicles green with black tips"; this is not correct. Buckton also mentions pink varieties amongst the apteræ and the pupæ as being green, brown or pink, the pink varieties often having a green dorsal band and faint lateral stripes. Now and then I have found these varieties on lettuces, but not on *Ribes*. Kaltenbach refers to *ribicola* as occurring on the Mountain currant in May and later on *Crepis viridis*. In the nymphæ there is no signs of any reticulation on the cornicles and the tips of the wing-cases are dusky; the antennæ paler. It has recently been placed in the genus *Macrosiphum* (or *Siphonophora*), but on going over my collection again I find it certainly approaches the type of *Myzus* more than *Macrosiphum*, and thus it is removed to the genus *Myzus*.

MYZUS LARICELLUS nov. sp.

Alate viviparous female. Head and thorax olive-green; thoracic lobes darker; abdomen green, with dark lateral spots and traces of dark lateral marks. Antennæ longer than body, dark, paler basally, thin. Cornicles long, dark. Cauda green. Legs green, apices of femora, tibiæ and all the tarsi dark. Segment i. of the antennæ larger than ii., with a marked median process on inner side; iii. thin, with 13 to 15 sensoria, not quite reaching apex; iv. scarcely longer than v. Eyes large, dark. Rostrum reaching to or nearly to the second coxæ, rather thick. Cornicles nearly as long as antennal segment iii. and somewhat thicker, apex with marked large reticulations. Cauda paler than cornicles,

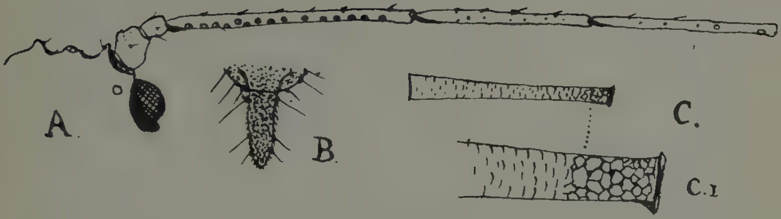

Fig. 157.—*Myzus laricellus* sp.nov.
Alate viviparous ♀. A. Head and antenna; B. Cauda; C. and C1. Cornicle.

about one-third their length, scarcely thicker, with three pairs of lateral hairs. Anal plate same colour, with several long hairs. Wings twice or more length of body; stigma yellowish-brown; veins darker; second cubital cell about twice as long as the stem.

Length 1.5 mm.

FOOD PLANT. Larch (*Larix europæus*).

LOCALITIES. Windermere, 2 vi. 14 (Rymer Roberts); Barmouth, N. Wales, 1 vi. 09 (F.V.T.).

Observations. This Larch-feeding Aphid is very marked, owing to the long, thin, dark cornicles. I only made rough field notes of the colours, the species being described from specimens preserved in seventy per cent. alcohol. The alatæ were surrounded by larvæ.

The only other known Larch Aphid is Walker's *Aphis tenuior* (Zoologist, VII., App. xlix.) in which the cornicles are "yellow, and one-eighth the length of the body."

The position of this species is somewhat doubtful.

MYZUS HIERACII Kaltenbach.

Aphis hieracii Kaltenbach.
Siphonophora hieracii Koch.
Macrosiphum hieracii Schouteden.

Kaltenbach, Mono. Pflanz, 17 (1843); Koch, Die Pflanz, 152, figs, 206, 207 (1855); Buckton, Mono. Brit. Aphid., I., 126, pl. XI. (1875); Schouteden, Mém. Soc. Ent. Belg., XII., 239 (1906); Theobald, Journ. Eco. Biol., VIII., 86, figs. 22-24 (1913).

Alate viviparous female. Head and thorax black, a green band between head and pronotum and pronotum and mesonotum. Abdomen green of various shades, with 5 interrupted black bands and traces of a sixth, and black lateral spots. Cauda dusky green. Antennæ black, as long as or longer than body; base of segment iii. pale; iii. with 25 to 36 sensoria; iv. with 4 to 11 usually on basal area; vi. with small basal area; iv. to vi. markedly imbricated, with a few simple hairs. Eyes reddish-brown. Cornicles dark brown, rather long, cylindrical, but in some expanding basally, a few large reticulations at apex, in some almost striæ. Legs green, apices of femora and tibiæ black; tarsi black; a few hairs on former. Rostrum dark at apex. Wing veins greenish brown; stigma brown; insertions yellowish-green.

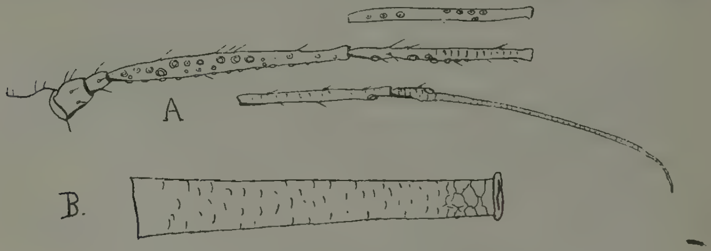

Fig. 158.—*Myzus hieracii* Kaltenbach.
Alate female. A. Antenna; B. Cornicle.

Length 2.2 to 2.5 mm.

Apterous viviparous female. Shiny; head blackish-brown; thorax and abdomen dark brown, except for green bands on

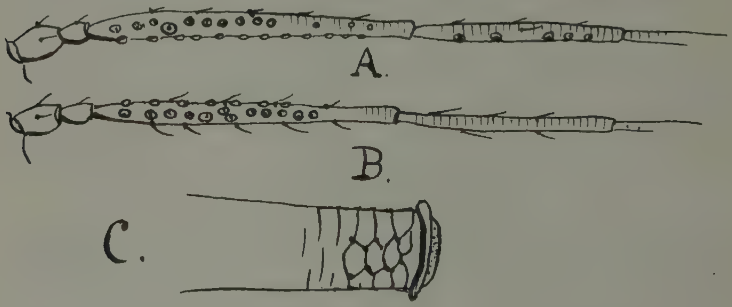

Fig. 159.—*M. hieracii* Kaltenbach.
A. Antenna of alate ♀; B. of apterous ♀; C. Apex of Cornicle of alate ♀.

thorax and apex of abdomen. Antennæ as long or longer than body, brown, somewhat hairy; segments iii. to v. paler except at apices; iii. somewhat swollen basally, with 11 to 15 sensoria on its basal half on one side, a few extending to near apex; some hairs slightly capitate. Cornicles deep green, with dusky apices, very faintly imbricated. Cauda short and dusky in young forms; pale and longer in mature individuals. Legs yellowish, with the apices of the tibiæ and tarsi brown; some with brown apices to the femora and some with the legs mostly pale brown.

Length 2.2 mm.

FOOD PLANTS. *Hieracium sylvestris*; *H. murorum*; *H. pilosellæ* (Schouteden); *Ballota nigra* and Burdock (Walker); cultivated *Hieracium*; *Crepis virens* and *Crepis sp.*

LOCALITIES. Great Salkeld (Britten); Niton, Isle of Wight, 2 v. 11; New Forest, 4 v. 12; Wye, 7 vi. 10 and 17, vi. 12; 19 viii. and 20 ix. 12 (F.V.T.); Morningside, Edinburgh, 11 vii. 22 (Evans); Swordale, Ross-shire, 15-23 viii. 17 and Craiglockhart (D. Jackson); Southgate, 31 v. 47 (Walker); Chester, vii. 25 (Dr. Thomas). E. Malling, Letchworth, Wimbledon Common (Laing).

Observations. This species is one of two common on wild *Hieraciums*, but especially on some cultivated kinds in gardens. It is subject to variation in colour and markings. Kaltenbach speaks of red varieties, having bristly tubercles on the back. Many apteræ assume a dull reddish appearance. The figures given by Buckton (pl. XI.), do not accurately represent this insect, as the alate viviparous female never seems to have actual black bars on the abdomen and the cornicles are not greyish-green as described in the text or green as shown in the figure, but are brown as described by Kaltenbach, some being very deep brown. It clusters up the flower-stalks, but may also be found on the leaves and even blossoms. In one cultivated *Hieracium* in which the hair glands secrete much sticky matter, these insects thrive and assume the colour of the plant tissue to a remarkable extent in the apteræ. No sexuaparæ are known. Buckton describes two *hieracii*, one a *Macrosiphum*, the other an *Aphis*.

Myzus aquilegiæ Theobald.

Macrosiphum aquilegiæ Theobald.

Journ. Eco. Biol., VIII., 92, 24 (1913).

Alate viviparous female. Head, thorax and abdomen green to yellowish-green, with brown markings as follows: two large median patches on thorax, a small one in front and a smaller one behind. Abdomen with four pairs of long transverse dark lateral lines and below each a dark spot. Antennæ longer than body, dark; segments i. and ii. and base of iii. pale green; iii. a little longer than iv., with a line of 11 sensoria; iv. slightly longer than v.; vi. about as long as iv. + v. Legs yellowish-green with dark apices to femora and tibiæ; tarsi dark. Cornicles long, thin, yellowish-green, apices dark, reticulate at apex, rest imbricated. Cauda pale, yellowish-green. A dark medial patch on sternum.

Length 2.5 mm.

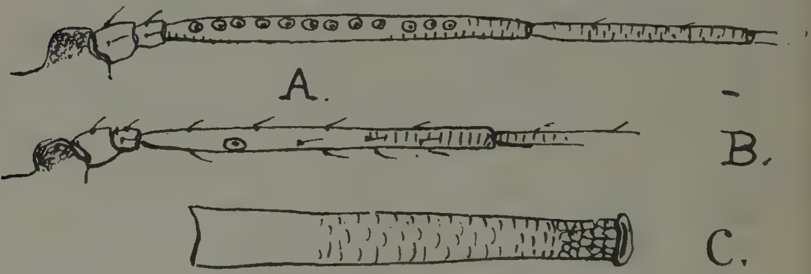

Fig. 160.—*Myzus aquilegiæ* Theobald.
A. Antenna of alate ♀; B. of apterous ♀; C. Cornicle of alate ♀.

Apterous viviparous female. Green to citron yellow, some show paler mottlings posteriorly, others darker green mottlings in middle and some a paler line along each side. Antennæ pale yellowish-green, black at apex, with 2 or 3 narrow black bands. Legs pale yellowish to pale green; apices of tibiæ and the tarsi dark; some show a black spot at apices of femora. Cornicles pallid with small dark apices; reticulate just at apex, rest imbricated. Cauda pale green. Some show dark abdominal spots similar to the alate female.

Length 2 mm.

Nymph. Yellowish-green, with a median dark thoracic spot. Abdomen with similar markings to alate female. Wing buds pale olive-green, darker than body. Legs with dark tarsi and apices to the tibiæ. Cauda darkened.

LOCALITIES. Chandler's Ford, New Forest, 24 iv. 12 (A. Duffield); Wye, 24 iii. 12 and 17 vi. 12; Little Hadham, Herts., 7 vi. 14 (F.V.T.); Stouting, near Hythe, Kent, 28 iv. 13 (A. Duffield); Tregarth, North Wales, 5 vi. 21 (Walton).

FOOD PLANTS. Wild and Cultivated Columbines (*Aquilegia*).

Observations. First taken by Mr. Duffield in the New Forest. I originally placed it in *Macrosiphum*, but it undoubtedly comes in *Myzus*. It clusters on the stems and leaves of Columbines and in one instance at Wye a whole bed of them were ruined.

MYZUS DUFFIELDII Theobald.

Macrosiphum duffieldii Theobald.

Journ. Eco. Biol., VIII., 88, 22, figs. 25-27 (1913).

Alate viviparous female. Head dark brown; antennæ dark brown, a small pale yellowish-green band at base of segment iii. and a small pale area at junction with head; as long as body; iii. with 9 sensoria close together in a row, and 3 wide apart nearer apex; hairs short and blunt. Eyes black. Pronotum dark brown, a narrow green band separating it from head. Mesonotum

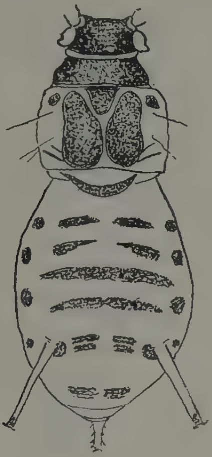

Fig. 161.—*Myzus duffieldii* Theobald.
Body markings of alate female.

with dark brown median lobes, green at sides and in front; metanotum dark in middle. Abdomen pale green, with 2 pairs of long black spots basally, almost forming bands, then 2 median black bars and a spot at base of each cornicle with 2 dark marks between; 4 pairs of black lateral spots. Cauda green. Cornicles long and thin; green with black apices, which are reticulate.

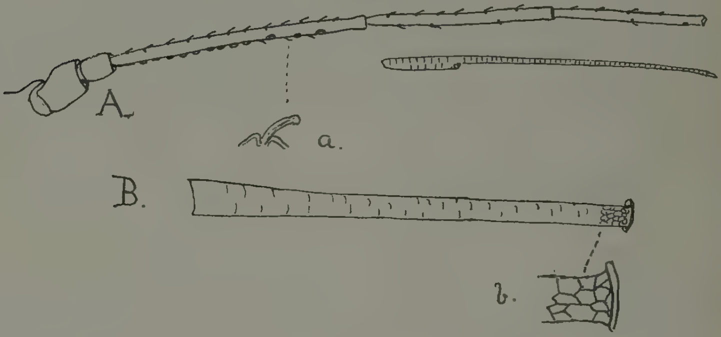

Fig. 162.—*Myzus duffieldii* Theobald.
Alate female. A, Antenna; a, Hair of antenna; B, Cornicle; b, Apex of cornicle.

Legs green, apices of femora and tibiæ deep brown. Wing veins pale brown. Venter of thorax brown to black and also coxæ; abdomen green, darker colour than dorsum.

Length 2.5 to 3 mm.

Apterous viviparous female. Head pale fawn to pallid ochre. Eyes black. Antennæ pale brown, apices of segments iii. to iv. black; last segment black. Thorax and abdomen pale apple green, becoming darker posteriorly. At base of cornicles is a large yellow area. Cauda pale yellowish-green. Cornicles pale

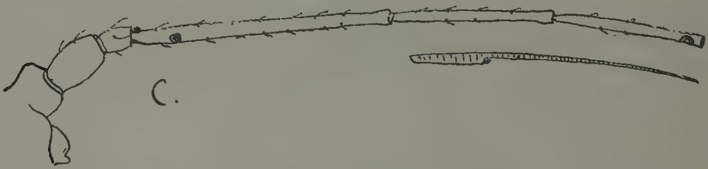

Fig. 163.—*Myzus duffieldii* Theobald.
Antenna of Apterous female.

yellowish-green, with dark apices. Legs very pale brown, with jet black tips to the femora and tibiæ; tarsi black.

LOCALITY. Maidstone, 27 iii. 13 (Duffield); Balham, S.W. 5 iii. 1924 (E. Crabbe).

FOOD PLANT. Tulips (*Tulipa spp.*).

Observations. This very marked insect was found in considerable numbers by Mr. Adrian Duffield in a nursery at Maidstone, where it was causing a good deal of damage to the leaves of Tulips. It is found both on and under the leaves, and some on the flower stalks. The alate females received on the 27th of March commenced to produce living young on April 3rd, and by the 7th quite large colonies existed. By the end of the week the alatæ seemed restless as if wishing to migrate. They reproduced however, on the Tulips, and a fresh brood of alatæ commenced to appear on April 22nd, and on a fresh Tulip being planted they at once settled on it and continued reproducing in numbers. The hairs on the antennæ are in marked pits and are short, thick and somewhat expanded apically, giving a quasi-clavate appearance. I originally took this to be a *Macrosiphum*, but on going over my collection recently I find it more closely approaches *Myzus*.

Two other Aphides occur on Tulips, namely, the *Aphis tulipæ* of Boyer, which is an *Anuraphid* (=*gladioli* Felt.) and my *Rhopalosiphoninus tulipælla*. *Aphis rumicis* has also been noticed on tulips.

Monell's *tulipæ** is probably *gei*, which is also common on Tulips in this country.

MYZUS PSEUDOSOLANI Theobald.

Macrosiphum solani Theob. (non Kalt.).

Theobald, Journ. Eco. Biol., VIII., 127, fig. 39 (1913); Ent. Mo. Mag., LII. (1919); Bull. I., S.E.A. Coll. Res. Dept., 8, figs. 5 and 6 (1922).

Alate viviparous female. Green; head and thorax darkened; a pale band between head and pronotum and another between the pro- and meso-notum; thoracic lobes dark and a dark spot at base of each fore wing. Abdomen with dark transverse bars, varying in form and three dark lateral spots and another at base of

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* Bull. U.S. Geo. and Geog. Survey of the Territories, Vol. V., No. 1, p. 19. 1879.

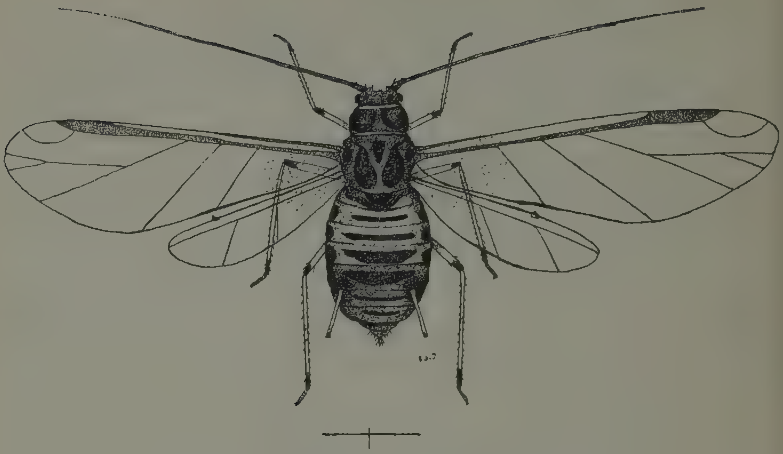

Fig. 164.—*Myzus pseudosolani* Theobald.
Alate viviparous female.

cornicles ; posterior parts of abdomen dusky green. Antennæ as long as or a little longer than body, darkened ; segment iii. with 14 to 23 sensoria in a line. Cornicles green, apices dusky, with 2 to 3 apical striæ, cylindrical. Cauda green. Legs green, base and apices of femora and apices of tibiæ and the tarsi darkened. Wings large, insertions yellow to greem.

Length 2.3 to 2.5 mm.

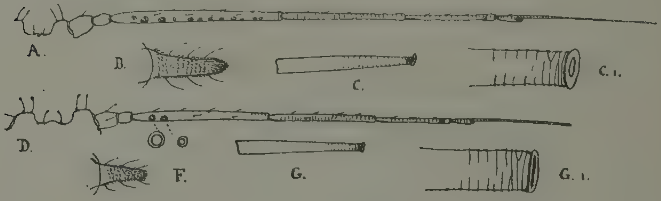

Fig. 165.—*Myzus pseudosolani* Theobald.
A, Head and antenna of alate female ; B, Cauda ; C, Cornicle ; D, Head and antenna of apterous female ; C, Cauda ; G, Cornicle.

Apterous viviparous female. Green, yellow-green to deep green, in many rusty-red patches behind as in *convolvuli.* Antennæ green, apices of segments iii. to v. dusky ; vi. dark ; iii. with 0 to 2 sensoria near base. Cornicles cylindrical, green, apices dusky ; three striæ near apex. Hairs of head and basal segment of antennæ capitate. Rostrum reaches second coxæ. Cauda about one-third length of cornicles.

Length 1.8 to 2.5 mm.

FOOD PLANT. Potato (*Solanum tuberosum*).

LOCALITIES. Great Salkeld, 11 viii. 11 (Britten); Helsby, Warrington, Yorks., 5 ix. 13; York, 2 ix. 09; Wragby, Lincs., 4 viii. 10; Bedford, ix. 97; Wye, i. to viii. 20 and ix. 24; ii. and iii. 22; Maidstone, 20 vi. 23; Hastings, 7 viii. 12; Exeter and Torquay, viii. 08; Wells, viii. 05; Reading, ix. 01; Kingston-upon-Thames, viii., ix. and x. 87; Cambridge, ix. 89; Bangor; Holyhead (Walton); Aberystwyth, vi. 23 (Jenkins); Swordale, Ross-shire, N.B. (D. Jackson).

Observations. Found so far only on potatoes and especially abundant on the sprouts of the seed, in company with *M. persicæ* and *M. gei*. It can at once be told from *persicæ* by the *pale cylindrical* cornicles. I originally took this insect to be Kaltenbach's *solani*. It can easily be demarked from *M. gei* by the non-reticulate cornicles. The banding of the abdomen in the alate female, is also very marked. It appears to be widely distributed on potatoes and I have seen it doing a great deal of damage in various places. Although it is especially abundant on the sprouts of the seed potatoes and which it readily kills, it also occurs in some years in great numbers in colonies under the leaves and in some instances I have noticed that it produces pale spots on the foliage above and later the whole plant tissue turns brown.

MYZUS PICEÆLLUS Theobald.

Macrosiphum piceælla Theobald.

Entomologist, XLIX., 146 (1916).

Alate viviparous female. Green, head brownish-green; pronotum greenish; thoracic lobes brown; abdomen with 4 black lateral spots before cornicles. Antennæ longer than body, dark brown, except segments i. and ii. and base of iii.; i. larger than ii.; iii. a little longer than iv.; iv. a little longer than v.; vi. a little longer than iii.; its flagellum about five times as long as basal area; iii. with 10 sensoria along one side, nearly extending to apex of segment. Rostrum pale, reaching nearly to second coxæ, apex dusky, apical segment narrower and longer than penultimate. Legs green; apices of femora and tibiæ dark; tarsi dark; very short hairs on tibiæ. Cornicles long, cylindrical, narrow, green, dark at apices, imbricate, a few irregular long reticulations at apices; reaching nearly to apices of cornicles. Cauda pale yellowish, three pairs of lateral hairs and one dorso-apical; very spinose. Anal plate pale yellowish; finely spinose Wing veins brown; stigma, costa and cubitus yellow-brown.

Length 2 mm.

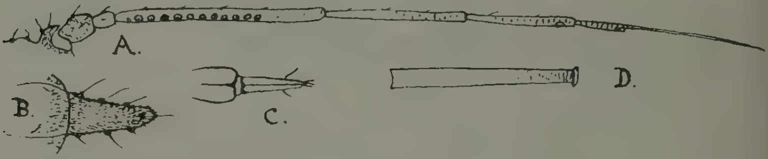

Fig. 166.—*Myzus piceællus* Theobald.
A. Antenna of alate ♀; B. Cauda; C. apex of rostrum; D. Cornicle.

Locality. Woking, Surrey, 17 iv. 13.

Food Plant. *Picea excelsa.*

Observations. Described from an alate female found surrounded by pale green larvæ on a Spruce needle. The cornicles have marked large imbrications and the antennæ are characteristic. This is the only Spruce Aphid I have seen or known described except Walker's *Neomyzaphis abietina.*

Myzus ranunculinus Walker.

Aphis ranunculina Walker.
Macrosiphum ranunculinum Theobald.

Walker, List. Homop. (B.M.), IV., 1046 (1852); Theobald, Journ. Eco. Biol., VIII., 151, 58, fig. 58 (1913).

Alate viviparous female. Yellowish to yellowish-green; head, thoracic lobes and a spot each side of pronotum deep brown to black. Antennæ deep brown, pale at base. Cornicles and cauda pale. Legs pale yellowish-brown; apices of femora, tibiæ and the tarsi dark. Sternal thoracic plate dark. Pronotum may be orange-yellow and head dark reddish-brown. Antennæ longer than body; segment i. a little longer than ii.; iii. much longer than iv., with 42 to 48 sensoria over whole length; iv. a little longer than v., with 0 to 10 sensoria; v. with 0 to 6 irregularly placed ; vi. not so long as iv. + v., its basal area half as long as flagellum. Rostrum yellow, apex dusky, rather thin, not quite reaching second coxæ. Cornicles thin, shorter than antennal segment iv., more or less cylindrical, but in some slightly swelling on apical half, imbricated, apex flared ; projecting beyond cauda in some, not all. Cauda small, with a few pallid hairs, scarcely quarter length of cornicles, turned upwards. Stigma and cubitus pale yellowish-brown ; veins pale yellowish-brown.

Length 1.5 to 1.8 mm.

Apterous viviparous female. Yellow of various shades, some semi-transparent ; apices of tibiæ and the tarsi dusky and apices of antennæ. Eyes dark. Antennæ not so long as body ; segment i. wider than ii., but scarcely longer ; iii. longer than iv., with 0 to 3 sensoria ; iv. a little longer than v. ; vi. shorter than iv. + v., its basal area more than half flagellum. Cornicles yellow, cylindrical, expanded at base, imbricated, longer than antennal segment iv. Cauda pale, much shorter than cornicles, only slightly longer than hind tarsi. Rostrum pale, reaching to about the base of the second legs.

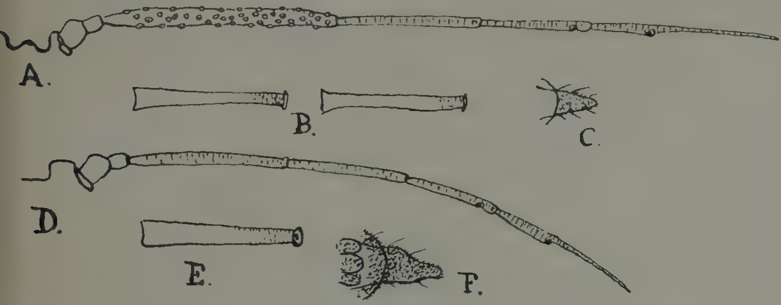

Fig. 167.—*Myzus ranunculinus* Walker.
A. Antenna of alate ♀; B. Cornicle ; C. Cauda ; D. Antenna of apterous ♀; E. Cornicle ; F. Cauda.

Length 1.4 to 1.9 mm.

Food Plants. Buttercups (*Ranunculus*).

Localities. Bowden, Cheshire, iv. to vi. 15 ; Wye, iv. 25 ; Guildford, 20 v. 13 ; Windermere (Rymer Roberts) ; Edinburgh, 20 x. 21 (Evans) ; Southgate (Walker) ; Aberdeen, 1877 (Buckton, Collection).

Observations. This Aphid occurs in small colonies on the leaves and up the flower-stalks. I first found it on the banks of the Wey at Guildford, and later it was sent me by Mr. Rymer Roberts from Bowden and Windermere. It especially feeds under the leaves, notably those close to the ground. One colony received on May 5th, contained a few nymphæ, which became alate on May 17th, and went on doing so until June 16th. It answers so closely to Walker's species, I have taken it to be so. The insect I described as *M. myrmecophilus* (Entomo., March, 1916) bears some resemblance, but the hairs on the latter are slightly capitate, the cauda relatively much longer, and the rostrum broader. Some specimen of alatæ show no sensoria or segments iv. and v.

MYZUS PERSICÆ Sulzer.*

Aphis persicæ Sulzer.
Aphis dianthi Schrank.
Rhopalosiphum dianthi Koch.
Aphis persicæ Passerini.
Aphis vulgaris Kyber.
Aphis rapæ and *dubia* Curtis.
Aphis vastator Smee.
Aphis persicæcola Boisduval.
Aphis persicophila Rondani.
Aphis antirrhinii Macchiati.
Aphis egressa Walker.
Aphis aucta Walker.
Aphis cynoglossi Walker.
Aphis redundans Walker.
Myzus malvæ Oestlund.
Siphonophora achyranthes Monell.
Phorodon cynoglossi Williams.
var. Rhopalosiphum solani Theobald.
Rhopalosiphum betæ Theobald.
Macrosiphum betæ Theobald.

Sulzer, Abgek. Gesch. Ins. 105, pl. 12 (1776) ; Kennz. Inseck, 105, Hist. Ins., pl. 11 (1761) ; Schrank Fn. Boica, II., 114, 12, 13 (1801) ; Kyber, Germar's Mag Ent., I, 9 (1815) ; Kaltenbach,

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* Sulzer's *description* of *persicæ* dates from 1776 ; there is no description by name in his 1761 paper (F. Laing).

Mono. Pflanz., 43 (1843); Walker List. Hom. (B.M.), 981, 80 (1852); Zoologist, XXXVIII. (*egressa*) (1849); Walker, Ann. Nat. Hist., 2, V., 391, 85 (1850); Zool., VI., 2218, 2246 (1848); VII., App. xlvi.; li; lvi. (1849); App. ciii. (1850); Koch, Die Pflanz., 42, figs. 55, 56 (1854); Curtis, Journ. Roy. Agri. Soc., III., 53, p. C, figs. 1 to 3 and 5 and 4 and 14; Morren, Ann. Sci. Nat. Zool. Se. 2, VI. (1836); Smee, The Potato Plant, 63 (1846); Passerini, Aphid. Ital., 20, 3 (1863); Boisduval, Essai. S. Ent. Hort., 251 (1867); Ferrari, Spec. Aphid. Liguriæ, 217 (1872); Buckton, Mono. Brit. Aphid, I., 178 (1876), and II. 15, pl. XLII. (1877); Thomas, 8th Rept. Ent. Ill., 73 (1879), and 76 (1879); Monell, Bull. U.S. Geol. Surv., V., 1, 18 (1879); Macchiati, Bull. Soc. Ent. Ital., XV., 228 (1883); Oestlund, Geol. Surv., Minn., 14th Rept., 31 (1886); Schouteden, Mém. Ent. Soc. Belg., XII., 234 (1906); Taylor, Journ. Eco. Ent., I., 83 (1908); Gillette and Taylor, Bulls. 133 and 134 Colo. Exp. Sta., U.S.A. (1908); Gillette, Journ. Eco. Ent., I., 359 (1908); Williams, Nebraska Univ. Studies, X., 2 (1910); Davis, Nebraska Univ. Studies, XI., 3, 36 (1912); Theobald, Entomo., XIV., 1912; Theobald, E. Sussex Naturalist, II., 4, 16 (1912) (*solani*); Theobald, Journ. Bd. Agri., XIX., 11 (1913) (*betæ*); Theobald, Journ. Eco. Biol., VIII., 153 (1913) (*M. betæ*); Theobald, Bull. Ent. Res., IV., 320 (1914) and VIII. 293 (1918); Matsumura, Journ. Coll. Agri. Tohoku Imp. Univ., VII., 362 (1917); Theobald, Bull. 1 S.E.A. Coll., Aphides attacking the Potato, 6, figs. 3 and 4 (1922); Walker Zool., VII., 33 (1849)=*aucta*; Zool., VI. 2217 (1848)=*cynoglossi*; Zool., VII., 32 (1849)=*redundans*. Blanchard, Physis., V., 211 (1922).

Adult Stem Mother. Pale green to almost pink, sometimes green with pink mottling, at others all green or all reddish. Antennæ of five segments, very pale, becoming dusky at apices, shorter than body, arising from prominent lobes; segment i. larger than ii.; iii. much longer than iv.; iv. a little shorter than v., which has basal area about as long as flagellum. Cornicles cylindrical, slender. Cauda green, moderately long, 2 pairs of lateral hairs and a sub-apical dorsal one. Legs pale, apices of tibiæ and the tarsi dusky. Rostrum pale, apex dusky, reaching just past second coxæ.

Length 1.6 to 1.8 mm.

Apterous viviparous female. Various shades of green, yellow to pale brownish-pink; shiny, rather acuminate posteriorly, but ovate in general form. Antennæ slightly shorter than body; with well marked frontal lobes on head; segment i. longer and wider than ii.; iii. about same length as iv.; iv. longer than v.; vi. shorter than iv. + v. Body often mottled, through the young showing within. Cornicles green, yellow or pale pink, apices usually dusky; very slightly swollen either in middle or just below or above; rather long and thin, a few striæ across apices. Cauda pale, about one-third length of cornicles, yellow or pinkish, 3 pairs of lateral hairs. Legs same colour as body; apices of tibiæ and the tarsi dusky; in some only the apices of tibiæ. Rostrum reaches to or just past second coxæ, apex dusky. A small lateral tubercle between cauda and cornicles. Subject to much variation in colour.

Length 2 to 2.5 mm.

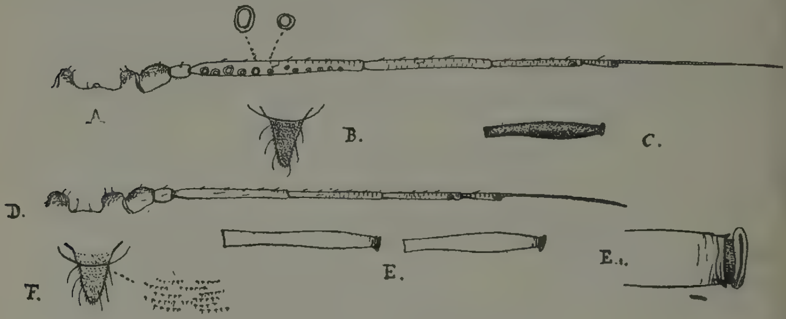

Fig. 168.—*Myzus persicæ* Sulzer.

A, Head and antenna of alate female; B, Cauda; C, Cornicle; D, Head and antenna of apterous female; F, Cauda; E, Cornicle.

Alate viviparous female (Autumn migrant). Head, pronotal band and thoracic lobes black. Abdomen rather shiny, reddish to greenish-yellow, with a large almost black dorsal patch before cornicles and often passing between them; 1 or 2 black bars in front and 1 or 2 behind it; in some a single black bar in front with 2 spots cephalad; 4 lateral black spots, 1 pair caudad of cornicles; sometimes there are 2 pairs of large spots instead of bars in front. Antennæ about as long as body, black to brown, base of segment iii. paler; i. a little longer and much wider than

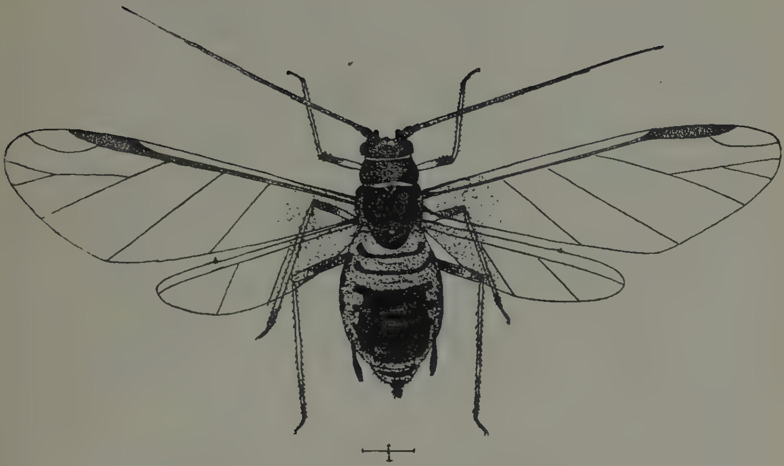

Fig. 169.—*Myzus persicæ* Sulzer.
Alate viviparous female.

ii.; iii. a little longer than iv., with a line of 8 to 14 sensoria; iv. much longer than v.; vi. about as long as iv. + v. Cornicles black to pale-brown, slightly swollen towards middle or apical half; rather long; 1 to 2 terminal striæ. Legs ochreous to reddish-green; femora all or partly blackish; also apices of tibiæ; tarsi black. Wings long, often as long again as body; insertions and cubitus yellow to yellowish-green; stigma grey to pale brown. Cauda dark, about two-thirds length of cornicles, with 3 pairs of lateral hairs and 1 dorso-apical; 2 small wart-like processes behind cauda. Eyes black.

Length 1.8 to 2.5 mm.

Colour varying very much even in same colony, some specimens being very dark, others pinkish-yellow, others almost green, some yellowish; the dark markings fairly constant.

Alate viviparous female (Spring migrant). Very similar to the autumn alate female, but the cornicles are now and then slightly more cylindrical and black, as is also the cauda.

Oviparous female. Apterous. Salmon pink to pale brick-dust red; apices of antennæ, tibiæ and cornicles dusky. Tarsi black. Cornicles slightly swollen distally. Antennæ about two-thirds length of body. Hind tibiæ broadened, with 20 to 30 sensoria.

Length 1.7 mm.

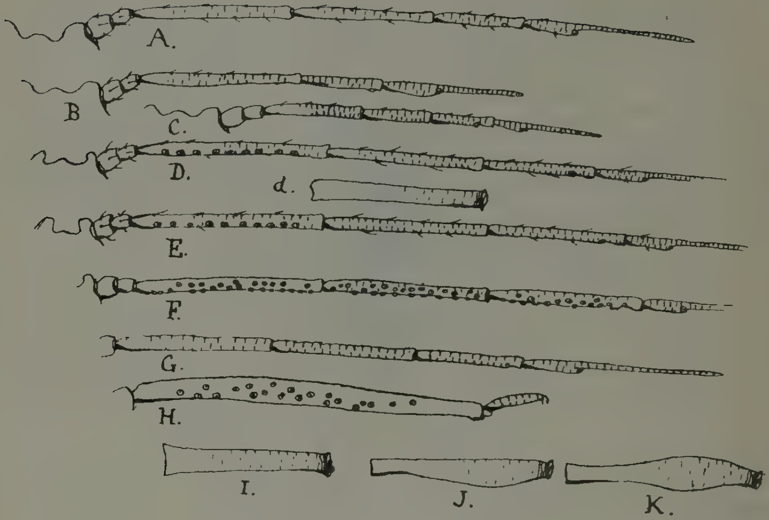

Fig. 170.—*Myzus persicæ* Sulzer.

A. Head and antenna of apt. ♀ 2nd generation; B. and C. of young and old Stem Mothers; D. Head and antenna of Spring migrant alate ♀; d. cornicle; E. antenna of return alate migrant; F. antenna of male; G. of oviparous ♀; H. hind tibia of oviparous ♀; I.J.K. Cornicles (d. and i. rarely seen in this country; J. normal for all stages).

Male. Very similar to alate autumn female, but smaller and darker. Cornicles and cauda black, former slightly swollen. Antennæ longer than body; iii. longer than iv.; iv. a little longer than v.; vi. shorter than iv. + v.; sensoria along whole length of iii., iv. and v. Frontal lobes prominent.

Length 1.8 to 1.9 mm.

FOOD PLANTS. (1) In Europe, Peach, Nectarine, Plum, Cherry, Almond; *Aquilegia vulgaris*; *Alliaria officinalis*; *Brassica oleracea*, *B. rapæ*, *B. napus*, *B. campestris*; *Beta vulgaris*, *B. maritima*, *Aubretia*, *Bunias kakile*; *Cochlearia armoracia*; *Capsella bursa-pastoris*; *Crepis sp*; *Calceolaria pinnata*; *Crocus*; *Callistemma*; *Citrus spp*; *Chrysanthemum spp*; *Cephanthus sp*; *Cerastium semidecandrum*; *Canna indica*; *Cactus spp*; *Carduus spp*; *Matricaria inodora*; *Chrysobactron*; *Euonymus*; *Chærophyllum sp*; *Cynara*; *Dianthus sp*; *Daphne spp*; *Digitalis sp*; *Erysimum barbarea*; *Euphorbia peplus*; *Fuchsia spp*;

Fumaria officinalis; *Geranium robertianum*; *Galium mollugo*; *Heliotropium peruvianum*; *Hyacinthus*; *Inula dysenterica*; *Leontodon taraxacum*; *Myrtus*; *Mesembryanthemum*; *Mentha hirsuta*; *Myosotis scorpioides*; *Nasturtium officinale*; *Narcissus spp*; *Nicotiana spp*; *Nerium oleander*; *Oxalis sp*; *Onopordon acanthium*; *Papaver rhœas*; *Potentilla anserina*; *P. recta*; *Plantago lanceolata*; *Polygonum persicaria*; *Pimilea sylvatica*; *Ranunculus sp*; *Raphanus sativus*; *Ruscus androgynus*; *Sanguisorba officinalis*; *Sinapis arvensis*; *S. alba*; *S. nigra*; *Sonchus spp*; *Sisymnium austriacum*; *Spergula arvensis*; *Syringa vulgaris*; *Solanum tuberosum*; *Tussilago sp*; *Tulipa sp*; *Thalictrum minus*; *Tropæolum tricolor*; *Valeriana pyrenica*; *Verbena*; *Urtica urens*; *U. piluliferæ*; *Lepidium draba*; *Humulus lupulinus.*

(2) In America Gillette and Taylor record a host of plants upon which colonies have been found in Colorado, besides the species previously mentioned, including: *Lilium candidus*; *Lactuca spicata*; *Amaranthus*; *Chenopodium album*; *Asparagus*; *Trifolium pratense*; *T. repens*; *Salsola tragus*; *Gossypium herbaceum*; *Rulac negundo*; *Viburnum opulum*; *Triticum sativum*; *Poa*; *Zea*; *Salix*; *Ricinus communis*; *Cineraria*; *Drysodia*; *Primula forbesi*; *Stellaria media*; *Lycopersicum esculentum*; *Malva*; *Tanasetum balsamifera*; *Vicia*; *Lupinus*; *Melo sp*; *Citrullus vulgaris*; *Marsilea vestita*; *Rudbeckia*; *Opuntia* (all in greenhouses); out of doors on Apricot, Plum, Cherry, Peach, Nectarine. As summer food plants *Viola tricolor*; *Malvastrum coccineum*; *Lepidium*; *Rumex*; *Convolvulus*; *Althæa rosea*; *Nasturtium armoracea* and many others mentioned

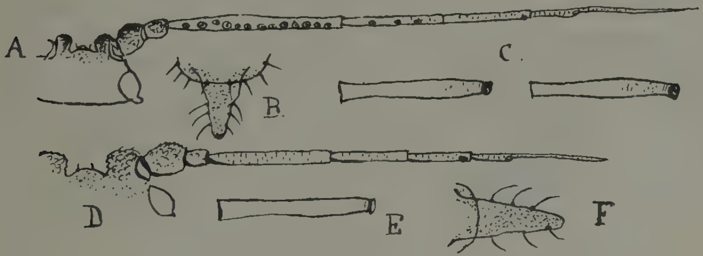

Fig. 171.—*Myzus persicæ* var. *cerastii.*
A. C., Alate ♀; D.-F., Apterous female.

in the European list. In the Argentine, Blanchard (Physis., 1922) records it from *Bellis*; *Cynara*; *Malva*; *Brassica*; *Solanum*; *Prunus*; *Beta*; *Vinca*; *Abutilon*; *Tulipa*, etc. The following are recorded as immune plants: Onions; Begonias; Oxalis; Coleus. But it occurs on Oxalis in Europe. From Japan it is recorded on *Humulus*, but I have only found it once on hops in England.

LOCALITIES. All over Great Britain and Europe; N. and S. Africa; N. and S. America; Australia; New Zealand; Japan; India; Iraq; Bermuda (Laing).

LIFE HISTORY. The ova are laid in the axils of the buds of Peach, Nectarines, *Daphne*, *Brassica*, and probably many other plants in October and November; I have found a few being deposited as late as December 12th. The ova are at first green, but later they become shiny black, like the majority of other Plant Lice eggs. They hatch out often as early as January on *Daphne* and on Peaches under glass. The young are dark green and gradually become lighter and by February the Stem Mothers may occur, but usually not until March. By the time the blossom is out they commence to produce living young, which are pale green and remain so, with now and then median and lateral darker lines. In May and June these become alate and fly off to Cabbages and various other vegetables, herbs and flowers. In October they may produce an alate return migrant brood and these fly back to the Peach, Nectarine, Cherry, *Daphne* and other woody plants. Alate males occur with the apterous oviparous females and ova are then deposited. The earliest date of hatching I have noticed in Britain is January 25th, in 1889 on *Daphne*, and February 26th in 1912. I found many Stem Mothers producing young on a *Daphne* at Wye. On Peach the earliest date I have is February 27th, and then only one or two eggs had hatched,

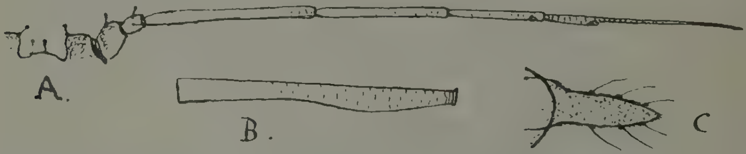

Fig. 172.—*Myzus persicæ* var. *portulacella*.
Apterous viviparous ♀. A. Head and antenna; B. Cornicle; C. Cauda.

but by the time the blossom was out they had all incubated. Under glass it hatches according to the forwardness of the trees. I have also found ova on Chrysanthemums and Tree Carnations and many on Cabbages. In greenhouses I have found them living and breeding right through the year; sexual forms occur side by side with the viviparous generations. It is often a very harmful species and damages the blossoms and later the leaves and the tips of the peach, etc., under glass, and on trees against walls they often cause much loss. It has also been reported to me on several occasions as very harmful to Cabbages, Thousand-headed Kale, Savoys, Sprouts and Carnations. It also occurs in great plenty on Sprouting seed Potatoes (as a variety) and was described by me as *Rhopalosiphum solani* Kalt.

Observations. This species is subject to a great deal of variation in colour. Walker mentions no less than twenty-one varieties of wingless females and three of the alatæ, but I feel certain that some of these belong to other species. There is also a great diversity in form, for instance the Peach form in spring and autumn has well marked frontal processes, and more or less cylindrical cornicles, and the apteræ have very short antennæ which place this insect in the genus *Myzus*; this form is the true *Aphis persicæ* of Sulzer. The summer form found on low plants, vegetables and herbs is the *Aphis dianthii* of Schrank, and has smaller frontal processes, more swollen cornicles and longer antennæ in the apteræ. This form was placed by Koch and others in the genus *Rhopalosiphum*. The type of the latter genus set by Gærstacher is *nymphææ* of Linnæus, which has no frontal tubercles, so that *persicæ* with most of the other Aphides placed in *Rhopalosiphum*

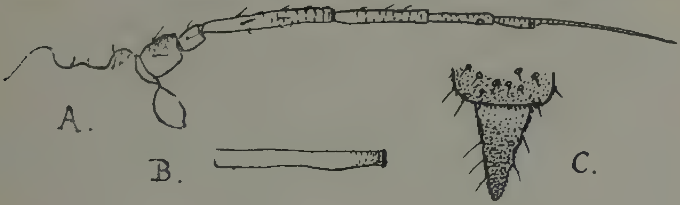

Fig. 173.—*Myzus persicæ* var. *sanguisorbiella*.
A. Head and antenna of apterous ♀; B. Cornicle; C. Cauda and anal plate.

have to be excluded. The two genera have been much confused. Buckton noticed that *R. dianthi* infested peaches and nectarines in autumn and says: "After *Myzus persicæ*, the spring species has for a time apparently left the trees." Again Buckton says: "Common on both peach and nectarine. The winged form may appear as early as the first week in May." He figures and describes the male taken in October and refers to the slightly black clavate cornicles. In 1870 it occurred in immense numbers on the Peach trees at Clifton, near Bristol. In June, 1914, I found swarms of this insect with *M. valerianella* on Red Valerian. Buckton places Koch's *Aphis institia* as a synonym. It seems to me to be quite a distinct Aphis. Morren in 1863 wrote a Memoir on this *Myzus persicæ*—Mémoire sur l'emigration du Puceron des Pêrcher (*Aphis persicæ*) et sur les characteres et l'anatomie de cette espèce (Ann d. Sci. Nat. Zool. 2 Se. VI.).

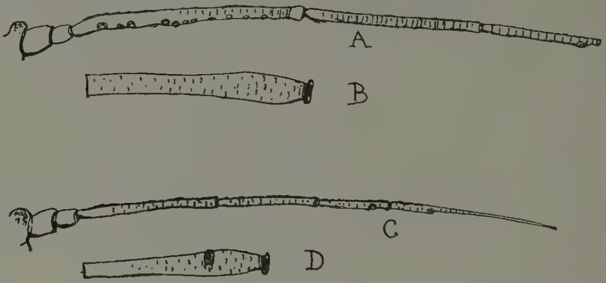

Fig. 174.—*Myzus persicæ*, var. *antirrhinii* Macchiate.
A. and B., alate ♀; C. and D., apterous ♀.

I have included amongst the synonyms Macchiate's *antirrhinii*, at least an insect feeding on Antirrhinums both in Great Britain and in Africa, which answers to his description and which I have found doing much harm in this country. On going over the specimens it seems to me that it can be only a variety or more correctly a biological form of the world-wide *persicæ* of Sulzer. (*Vide* Macchiate, Soc. Ent. Ital., XV., 228 (1883); Theobald, Journ. Eco. Biol., VIII., 157 (1913).) This form was found at Glasgow, N.B., ; Wye, Kent; Moro, British East Africa, 16 i. 12. Mr. Laing has *persicæ* from Antirrhinums from Cambridge and Hendon.

A very small dark race has been found on the rare Nettle (*Urtica pilulifera*) on the sandhills at Littlestone. Living specimens looked a totally different insect, but when mounted I can see no structural difference. A distinct variety I have also found on *Portulaca oleracea* (Fig. 172) the cephalic hairs being slightly capitate. Specimens from *Sanguisorba* (Fig. 173) occurring with Schranke's *Aphis sanguisorbæ* have the cornicles shortened and the insect on *Cerastium* also presents a different general appearance. In the last there are sensoria on antennal segment iv. of the alate female (Fig. 171).

NATURAL ENEMIES. I have found the larvæ of *Syrphus ribesii*, *S. grossulariæ* and *Catabomba pyrastri* feeding on this Aphid in England, and have often seen Syrphid larvæ rapidly clearing them off Peach leaves. The Lady-bird Beetles, *Adalia bipunctata* and *Coccinella septempunctata*, also prey upon it. I have twice seen it parasitised by Chalcids in great numbers. Gillette and Taylor say a species of *Lysiphlebus* destroys large numbers, especially in greenhouses in America, and the Chalcid genus *Aphelinus* also attacks it. When attacked by the Chalcid, the insects turn black and shiny ; when by *Lysiphlebus* a grey or light drab colour and much swollen. Probably Walker's black variety was a parasitised specimen. I have also found them to be attacked by fungi and killed by them in thousands.

Whilst visiting a fruit farm at Rudgewick in Sussex in 1913, I found a fungus clearing off this Aphid under glass much more successfully than any predaceous or parasitic insects ever do.

Synonymy. There seems little doubt that Schrank's *Aphis dianthi* is the same as Sulzer's *A. persicæ*. Davis has examined Williams' type of *Phorodon cynoglossi* and shows it to be this insect. Gillette has shown that the American *achyranthes* of Monell to be the same. Curtis' *A. rapæ* and *A. dubia* may also be *persicæ* and apparently also Kyber's *A. vulgaris* and Smees' *A. vastator.* Walker's *Aphis egressa* according to Laing is this insect. Walker also places Kaltenbach's *A. solani* as a doubtful synonym. I add as a synonym Passerini's *persicæ* on Ferrari's authority. Laing (Entomologist, May, 1925) shows that Walker's *aucta*, *cynoglossi* and *redundans* are all this insect.

Myzus persicæ var. solani Theobald. I referred to this in the Entomologist, XLV., 1912, and the E. Sussex Naturalist, II., 1, 16 (1912). It was originally found feeding on seed potatoes, and I took it for Kaltenbach's *solani.* It is only a variety or race of *Myzus persicæ*. It, with *Myzus pseudosolani* Theobald and *Macrosiphum gei* Koch, frequently causes much harm to the sprouting potato seed and is one of the carriers of the Virus diseases of the potato.

Myzus betæ Theobald is also only a race of *persicæ*. I originally described this as *Rhopalosiphum betæ* (Journ. Board of Agriculture, XIX., 11 (1913) and referred to it as *Macrosiphum betæ* in 1913 (Journ. Eco. Biol., VIII., 153 (1913). Much damage was done by it to Mangolds and Beets, and it occurred on several wild *Chenopodiaceæ* in Kent in 1922. It occurs in small colonies as a rule, usually isolated and causes the leaves to curl up.

MYZUS VACCINII Theobald.

Ent. Mo. Mag., LX. 3rd se., 128. fig. 5 (1924).

Alate viviparous female. Head and thorax dark ; abdomen green. Basal segments of antennæ pale ; iii. dark, except basal area ; iv. and v. dark, but somewhat paler basally ; vi. all dark. Legs yellowish-green except apices of femora, tibiæ and all the tarsi. Cornicles dark. Cauda green. Eyes reddish black. Antennæ longer than body ; segment i. much larger than ii. ; iii. longer than iv., but not so long as vi., with 16 to 19 round sensoria on one side reaching nearly to apex, the sensoria of two sizes ; iv. and v. about equal ; vi. with long flagellum. Cornicles long, about as long as antennal segment iii., rather narrow, swelling on apical half. Cauda acuminate, constricted near base, two hairs on each side and one sub-apical one ; finely spinose ; about quarter length of cornicles. Wings large ; stigma and veins brown, the veins faintly bordered with pale brown. Tibiæ with numerous hairs.

Length 2mm.

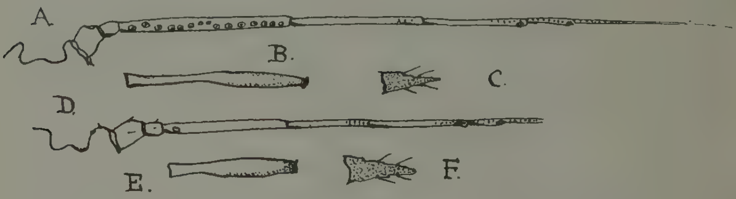

Fig. 175.—*Myzus vaccinii* Theobald.
A. Head and antenna ; B. Cornicle ; C. Cauda of alate ♀ ; D.E.F. of apterous ♀.

Apterous viviparous female. Green, except apices of antennal segments iii. to v., which are dusky; vi. dusky; also the tarsi. Eyes red. Segment i. of antennæ larger than ii.; iii. longer than iv.; one shows a single sensorium at base of iii.; iv. and v. about equal; basal area of vi. more than one-third of v. Rostrum reaching to third coxæ. Cornicles green, about as long as third antennal segment, slightly swelling on apical half. Cauda green, nearly half the length of the cornicles, finely spinose; two hairs each side and one sub-apical. Tibiæ with numerous small hairs.
Length 1 to 2 mm.

FOOD PLANT. *Vaccinium vitis-idæa.*

LOCALITY. Penistone, Yorks., 14 vii. 23 (Dallman).

Observations. Described from two alate females and some apteræ. The cornicles in the alate female are very marked owing to the length. Differs from *persicæ* in having 2 hairs each side of cauda. Types in the writer's collection.

MYZUS POLYGONI Buckton.

Siphonophora polygoni Buckton.
Macrosiphum polygoni Theobald, etc.

Buckton, Mono. Brit. Aphid., I., 123, pl. X., figs. 1-3 (1875); Theobald, Journ. Eco. Biol., VIII., 115, 27 (1913).

Alate viviparous female. "Yellowish to green. Head, pronotum and thoracic lobes and scutellum deep brown; pronotum with a yellow band in front. Abdomen with four or five broken transverse bands, three large dark spots at the sides of the bands, and five smaller marginal spots and a semi-circular one over the base of each cornicle. Cornicles black, expanded basally, rather long. Cauda yellow, about one-third of the length of the cornicles. Legs yellow and hairy; black femoral and tibial apices, and black tarsi. Venter clear yellow, with dark brown meso-sternum and anal valve.
Length 1.7 mm; wing expanse 8 mm.

Apterous viviparous female. Pale yellow. Antennæ long, dusky at apex, also at apices of segment iii. to v.; apex of tibiæ dark; tarsi dark. Cornicles dark.
Length 2.5 mm."

Nymph. "Small, pale yellow or luteous. Head broad. Eyes red. Antennæ very long. Tips of wing cases, nectaries and tarsi slightly olive. Tail yellow." (Buckton.)

LOCALITIES. Barmouth, N. Wales; Wye (F.V.T.); Haslemere (Buckton).

FOOD PLANT. *Polygonum persicaria.*

Observations. I have a note re finding an insect on *Polygonum* in May, 1905, near Barmouth, and more recently an alate female near Wye (1910), but the actual specimens have been lost. Buckton found pupæ and alatæ at the end of June. It appears to be a very marked species, and comes in *Myzus* and not *Macrosiphum* as Buckton says: "Frontal tubercles not much developed." Mr. Laing informs me the specimens of Buckton's in the British Museum are in poor condition.

MYZUS GLAUCII Theobald.

Ent. Mo. Mag., IX., 103 (1923).

Alate viviparous female. Green; head and thorax deep brown; thoracic lobes black; a darker median abdominal area and dark lateral spots. Cornicles and cauda deep olive-green to pale olive-green. Antennæ olive green, apices of segments iii. to v. darker. Segment i. very much larger than ii.; iii. long, about as long as flagellum of vi., with 10 sensoria in a line on one side; iv. much shorter than iii., and a little longer than v.; basal area of vi. long, about one-third of v. Antennæ longer than body. Four short hairs on front of head; lateral processes marked. A marked dark patch by lateral stemmata. Eyes large, protuberant. Rostrum reaching to second coxæ; apical segment longer and much narrower than penultimate. Cornicles long, cylindrical, slightly expanding at base, about as long and a little thicker than antennal segment v.; a few striæ at apices. Cauda about one-quarter length of cornicles, rather thick, with 3 hairs each side. Legs olive green; apices of femora deep olive-green; apices of tibiæ and the tarsi deep brown.

Length 1.7 mm.

Apterous viviparous female. Green; segment iii. of antennæ dark, with two prominent projecting sensoria near base; segment i. very much larger than ii., both pale (remaining segments absent). Rostrum green, apex dark, short and thick, just reaching past

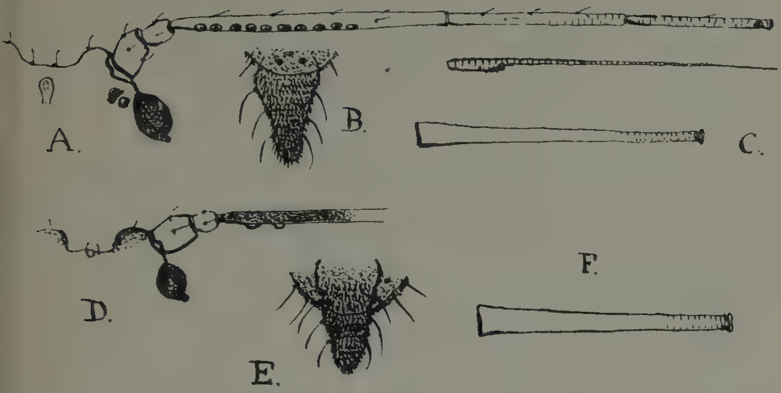

Fig. 176.—*Myzus glaucii* Theobald.
A.-C., alate ♀; D.-F., apterous viviparous ♀; A. D., head and antennæ; B. E., cauda and anal plate; C. F., cornicles. A. and B. × 40; C. and F. × 60.

second coxæ; apical segment about same length as penultimate. Cornicles long, thin, cylindrical, apices dusky, rest green; slightly expanding basally. Cauda about one-third of the cornicles, broad, bluntly acuminate, with 3 hairs each side; projecting beyond cornicles. Apex of body with a few rather long hairs. *Length* 1.8 to 2 mm.

FOOD PLANT. Yellow Horn Poppy (*Glaucium luteum*).

LOCALITY. Cheshire 14 iv. 21.

Observations. Described from a perfect alate viviparous female, a much damaged apterous female, sent with many larvæ and nymphæ. They were swarming on the Yellow Horned Poppy on the Cheshire side of the Mersey. The pigmented patch each side of the lateral stemmata in mounted specimens is very characterisitc.

MYZUS CIRCUMFLEXUS Buckton.

Siphonophora circumflexa Buckton.
Macrosiphum circumflexum Theobald, etc.
Myzus vincæ Gillette.
Neomyzus circumflexus V. d. Goot.

Buckton, Mono. Brit. Aphid., I., 130, pl. XIII. (1875); Theobald, Journ. Eco. Biol., viii., 2, 116, 118, fig. 32 (1913);

Gillette, Canad. Ent., XL., 19, pl. I., figs. 4 and 5 (1908); Van der Goot, Zur Kennt. d. Blatt Javas., 50 (1917); Blanchard, Physis., V., 20. 213, fig. 14 (1922); Oestlund, Rept. St. Ent. Minnesota, 139 (1922).

Alate viviparous female. Green; head and thorax dark; abdomen with various irregular dark markings, a common type being a semi-circular patch behind the scutellum, then 5 broken bands and 2 more prominent ones near the apex; in others the bands fuse before the cornicles to form a dark patch; on others the bands are more uniform, some are almost all green on the abdomen. Cauda black. Antennæ black, variable in length, as long as or slightly longer than body; segment iii. with a line of about 16 sensoria on one side, reaching to apex of segment, last 2 separated by a small space from others; iv. nearly as long as iii., with 3 sensoria; v. shorter than vi.; vi. very thin, much longer than iv. + v. Cornicles long and thin, black to dusky green, cylindrical, faint imbrication.

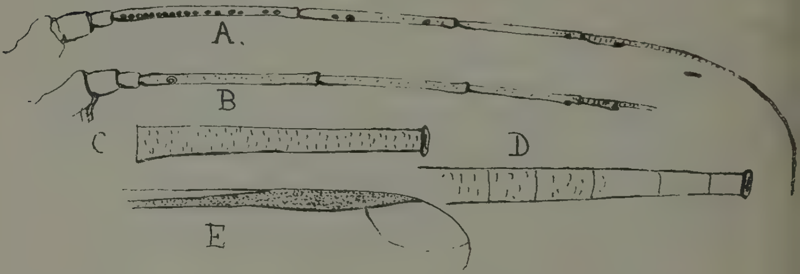

Fig. 177.—*Myzus circumflexus* Buckton.
A, Antenna of alate female; B, of apterous female; C and D, Cornicles of apterous and alate females; E, stigma of wing.

Cauda green, spinose. Legs same colour as body; apices of femora, tibiæ and the tarsi dark.

Length 1.6 to 1.7 mm.

Apterous viviparous female. Bright, shiny, yellowish-green; thorax with 1 to 2 dark spots on each side. Abdomen with dark patches, one forming an irregular horse-shoe shaped area and a large black patch. In some these typical markings are quite absent. Antennæ yellow to green, apices of segments iii. to v.

dusky and all vi.; frontal tubercles markedly porrected; antennal segment iii. longer than iv., with a sensorium near base; v. a little shorter than iv.; vi. longer than iv. + v. Cornicles rather long and thin, yellow, in some dusky at apices; imbricated. Some colonies show no markings, except here and there, the insects being uniformly pale yellow or pale yellowish-green. In others the dark markings are very pronounced.

Length 1.6 to 1.8 mm.

FOOD PLANTS. Arum Lilies; Chrysanthemums; Tulips; Cyclamen; Fresias; Spiræas; Cinerareas; Schizanthus; Persimmon; Vinca; Orchis; Hordeum; Avena; Linum; Figs; most plants under glass are attacked, out of doors the Larger Periwinkle is most attacked. Only once have I found it on *Orchis*. Blanchard records it on *Vinca major*. Laing records it on *Oxalis*, *Alisma*, *Dahlia*, *Watercress*, *Lycium*.

LOCALITIES. All over Great Britain and Europe; North America; Buenos Aires (Blanchard).

Observations. This is one of the most common greenhouse Aphides and is frequently a serious pest. I have at different times kept thousands, but have never been able to obtain the sexual forms. Asexual reproduction may continue for at least four years and apparently may go on for much longer. I have found it in every month of the year under glass, but it increases most rapidly from February to May on Arum Lilies, etc. I have never been able to obtain alate females under glass before the end of May. Buckton considered it an early spring species, but I have found it just as destructive in autumn and even in winter under glass. Buckton also points out that the early alate forms do not develop such long antennæ as those that emerge in June. Gillette undoubtedly describes this insect as *Myzus vincæ* from America, feeding on Liliaceous plants, Asparagus, Asparagus Fern, Aquilegia, Rumex sp., in a greenhouse, and also taken repeatedly on Vinca and Asparagus in greenhouses. His figure is quite typical of *circumflexus* (Canad. Ent. XL.).

On May 22nd, 1916, I found it in great abundance on Periwinkles (*Vinca major*) in Wye Churchyard; apteræ were swarming and showed the well-marked characters figured by Buckton; some were also uniform green or yellow, just as one sees under glass. Many alate females were also appearing; these clustered densely in the young terminal leaf tufts and not near any blossom. Since then it has been repeatedly found on Vinca. About the same time I found it in the White Hill Chalk quarries near Boughton, on the Sweet Scented Habernaria, or Mauve Butterfly Orchis, many colonies of apteræ showing typical adornment and living in the blossom spikes. It thus appears to be an outdoor species, as well as one under glass. Laing says: "It will breed quite readily out-of-doors in midsummer." The alate female appears dark green with black head and thorax, but when put in alcohol becomes paler and shows dark dorsal broken banding on the abdomen.

MYZUS HYDROCOTYLEI Theobald.

Ent. Mo. Mag., LXI., 73, 1925.

Apterous viviparous female. Various shades of green, from very pale translucent green to apple green, with deeper dorsal markings. Antennæ same colour as body, apices of segments iii. to v. dark; vi. all dark. Cornicles green, apices dusky. Legs same colour as body; apices of tibiæ and the tarsi dark. Eyes deep red. Rostrum green, apex dark. Cauda and anal plate green. Porrected lateral lobes of head, with 2 hairs each side and 2 in the middle of head. Segment i. of antennæ much larger than ii.; iii. longer than iv., with 1 to 2 round sensoria near base; iv. about as long as v.; flagellum of vi. very long. The rostrum is long and reaches to or past third coxæ. Cornicles rather long and thin, cylindrical, not quite so long as antennal segment iii., 2 or 3 wide reticulations at apices. Cauda less than half length of cornicles, bluntly acuminate, 3 hairs each side. Anal plate and apex of body with some rather long hairs. A few hairs scattered over body and head. Legs rather long and thin, many hairs on tibiæ and a few on femora.

Length 1.3 to 1.9 mm.

FOOD PLANT. Marsh Pennycress (*Hydrocotyle vulgaris*).

LOCALITY. Hawarden, 11 viii. 24 (A. A. Dallman).

Observations. Several adult apterous females and many larvæ were sent me alive by Mr. A. A. Dallman. They fed on the upper surface of the leaves. The young were quite transparent, but all showed a bright green spot at the base of the cornicles. As they matured they became very pale, translucent green and the spots became a deeper colour, until at the final month the whole body became the same colour, except for the variable deeper dorsal markings.

MYZUS FESTUCÆ Theobald.

Entomologist, L., 80 (1917) ; Bull. 2 S.E.Agri. Coll. (1923).

Alate viviparous female. Head and thorax brown ; thoracic lobes dark. Abdomen green, with 2 rows of black spots each side. Antennæ longer than body, dark brown, except base of segment iii. and apex of vi. ; i. much longer than ii. ; iii. a little longer than iv. and not so long as vi., with 15 to 20 round sensoria more or less in a line along whole length ; iv. a little longer than v. : basal area of vi. about quarter length of flagellum. Rostrum rather broad, reaching to base of second coxæ, apex dark. Eyes black and prominent. Cornicles green, varying from dull green to pale brownish-green, rather more than one-third length of body, cylindrical, well flared at apices, faintly imbricated. Cauda green, much thicker than cornicles, about or less than half their length, finely spinose ; 3 lateral hairs one side, 2 the other, and 1 curved sub-apical one. Legs green, apices of tibiæ and the tarsi dark, moderately long ; tibiæ with a few stiff hairs. Wings normal.

Length 1.8 to 2. mm.

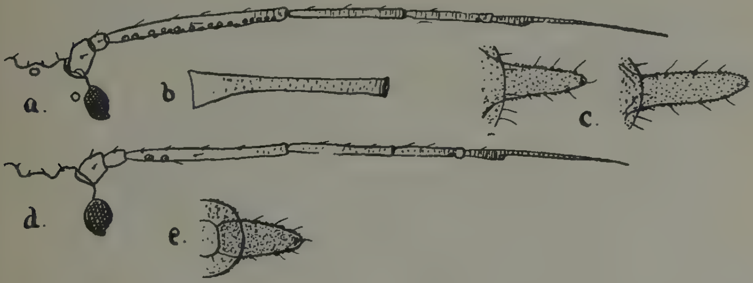

Fig. 178.—*Myzus festucæ* Theobald.

A. Head and antenna ; B. cornicle and C. two forms of cauda of alate female. d. and e. of apterous female.

Apterous viviparous female. Pale green, yellowish green to dull greenish-pink. Antennæ a little longer than body, green, except segment vi. and apex of v., both of which are darker ; i. much larger than ii. ; iii. longer than iv., but a little shorter than

vi. ; iv. slightly longer than v. ; vi. about as long as iv. + v., its basal area one quarter length of flagellum. Cornicles and cauda green ; the former about one-third length of abdomen, cylindrical, rather thin and showing 2 faint apical striæ. Cauda rather thick and bluntly pointed, with 3 hairs each side or 3 one side and 2 the other, faintly spinose and about half length of cornicles, and more than twice as broad. Legs green or same colour as the body except apices of femora and tibiæ, the latter with a few short, stiff hairs.

Length 1.5 to 2 mm.

Nymph. Antennæ relatively shorter than in alate and apterous females ; wing-buds green or dusky green. Cauda bluntly triangulate and the cornicles relatively shorter than in the mature forms.

FOOD PLANTS. Fescue Grass (*Festuca ovina*), and the variety *rubra* and other grasses, also on Wheat, Barley and Oats.

LOCALITIES. Wye 25. v. 16 ; v. vi. and vii. 23 ; Benenden, vi. 23 (F.V.T.) ; Aberystwyth, iv. and v. 23 (Jenkins) ; Selby, Yorks ; Guildford ; Romsey, vii. 23 (F.V.T.) ; London District, v., 1923 (Laing) ; Ewloe Green, Flintshire, vi. 23 (Walton).

Observations. This Aphid was first found swarming on Festuca grass under an old Yew Tree in Wye Churchyard, by Mr. Langham and M. Hassan Efflatoun. The grass was killed by the swarming lice. They became alate in late May, and most disappeared. The apteræ are very sluggish, but the nymphæ readily fall off the narrow grass leaves. In 1923 I received it from several localities where it was attacking grasses in meadows and also cereal crops, and did much harm to the former, whole fields turning brown from the constant sucking of the swarms of insects. It was also common on wild wheat at Wye in the same year.

MYZUS CONVOLVULI Kaltenbach.

Aphis convolvuli Kaltenbach.
Aphis vincæ Walker.
Siphonophora convolvuli Buckton.
Macrosiphum convolvuli Theobald.

Kaltenbach, Mono. Pflanz., 40 (1843); Walker, Ann. Nat. Hist., Se. 2, II., 429, 52 (1848); Buckton, Mono. Brit. Aphid., I., 148, pl. XXI. (1875); Theobald, Journ. Eco. Ent., VIII., 114, 26 (1913).

Apterous viviparous female. Green, tinged with rusty red at base of cornicles, and on posterior part of abdomen. Antennæ pale yellowish-brown to brown, apices of the segments iii. to v. dark; vi. all dark; iii. longer than iv.; iv. longer than v.; vi. as long as iv. + v.; iii. with 1 to 3 round sensoria near the base, the whole antenna not quite so long as the body to about its length; frontal tubercles marked. Two short thick hairs on the frons. Eyes black. Rostrum green, apex dark, reaching to second coxæ. Legs green; apices of femora and tibiæ dark; tarsi dark; tibiæ hairy; femora with a few hairs. Cornicles pale green, apices rusty brown; imbricated, thin, rather long, expanded basally. Cauda pale rusty-brown to green, about two-thirds length of cornicles, 3 hairs each side and 1 apical sub-median one.

Length 2.5 to 2.8 mm.

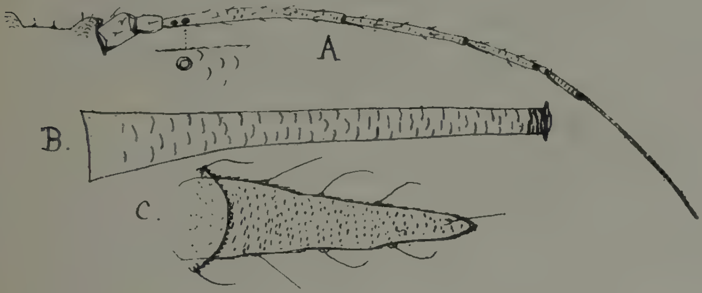

Fig. 179.—*Myzus convolvuli* Kaltenbach.
Apterous female. A, Antenna; B, Cornicle; C, Cauda.

Alate viviparous female. Green. Head, band on pro-notum and meso-notum shiny black. Antennal segment iii. with 14 to 18 sensoria along one side. Abdomen bright greenish, with a broad black patch on the dorsum and 4 cross stripes; and 3 large lateral spots. Cornicles green, tipped with black. Legs ochreous, rather short; femora and tibiæ tipped with black. Cauda small, green. Wings with pale yellow insertions and yellow cubitus; stigma grey; veins ginger-yellow.

Food Plants. Large and Small Periwinkles (*Vinca major* and *V. minor*); Convolvulus (*Convolvulus major, C. minor* and *C. sepium*); *Nemophila sp.* Also on *Clematis vitalba*, apteræ 3 v., 1923 (Laing).

Localities. Chichester and Haslemere (Buckton); Stowting, near Hythe, Kent (Duffield); Wye and Gloucester (F.V.T.): Sevenoaks (Massee); Kew Gardens; Hendon; New Zealand, Chirstchurch, J. G. Myers' coll. (F. Laing).

Observations. This insect originally described by Kaltenbach as *Aphis convolvuli*, was later described by Walker as *Aphis vincæ*. Mr. Allan Duffield found it on April 27th, 1913, in quantities on Periwinkles near Hythe. Buckton found it in June at Chichester and Haslemere. I found it at Wye on both species of *Vinca* and on *Convolvulus*, and also at Gloucester. It is a very marked species and can at once be told by the rusty red markings on the abdomen in the apteræ. Slides of *vincæ* Walk. are in the Hope Museum, Oxford, found on periwinkle, Southgate, 8th and 20th May, 1847, and they are the same as *convolvuli*. Walker's locality for *convolvuli* in Hope Museum is Edmonton. Kaltenbach found his specimens in August and September. Now and then the cornicles of the apteræ are swollen in the middle.

Buckton describes the alate female as follows: "Green. Head, band on pro-thorax and mesothorax shiny black. Frontal tubercles somewhat gibbous. Third joint of antennæ somewhat serrated. Abdomen ovate, bright green, with a broad black patch on the dorsum and 4 cross stripes. Three large lateral spots. Cornicles curved, and slightly thickened in the middle; green and tipped with black. Legs ochreous, rather short; femoral and tibial tips black. Tail small and green; rostrum reaches nearly to second coxæ. Wings with pale yellow insertions and yellow cubitus. Stigma grey. Veins ginger-yellow. Length of body 2.02 mm."

MYZUS PRIMULÆ Theobald.

Macrosiphum primulæ Theobald.

Journ. Eco. Biol., VIII., 91, 23 (1913).

Alate viviparous female. Head brown; eyes black; antennæ brown, a small pale area at base of segment iii., about as long as body; segment iii. with 35 to 40 sensoria, along nearly all its length. Pronotum brown; mesonotum yellowish-green, with brown lobes, and a small median brown area in front; dark brown areas at sides; metanotum brown in middle; head and prothorax pale beneath, rest of thorax black. Abdomen apple green to pale yellow-green, with 3 transverse dark bars and 2 caudad, now and then more or less fused at sides, followed by a small median dark spot and traces of 2 other transverse dark markings; 3 pairs of dark lateral spots and a dark spot near base of cornicles. Cauda pale brown to yellowish-green; cornicles pale brown to yellowish-green, faintly imbricated. Legs yellowish-green, apices of femora and tibiæ black; tarsi black. Stigma grey; veins pale greyish.

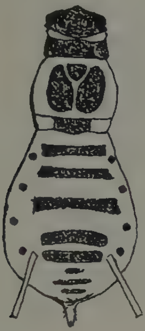

Fig. 180.—*Myzus primulæ* Theobald.
Body markings of alate female.

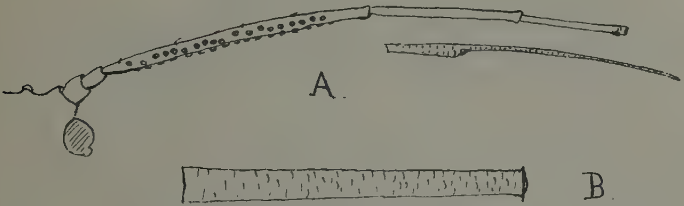

Fig. 181.—*Myzus primulæ* Theobald.
Alate female. A, Antenna; B, Cornicle.

Length 2.5 mm.

Apterous viviparous female. Shiny, pale yellowish to yellowish-green; eyes black, small; apices of cornicles black; tarsi dusky. Most with black specks on body. Segment iii. of antennæ with several sensoria (5 to 8) near base. One specimen dusky-brown, with dark apices to femora and tibiæ.

Length 2.2 to 2.5 mm.

FOOD PLANTS. *Primula kewensis* and *Primula sp* ?

LOCALITIES. Maidstone, 27 vi. 13; Canterbury, 4 iv. 18 (F.V.T.); Hendon, 1920; Tooting Common, 1923 (F. Laing).

Observations. First found by Captain Duffield in a nursery at Maidstone on *Primula kewensis.* A dark form occurred, but it was certainly the same species. This Aphid is very active when in the apterous stage, especially when removed from the plants.

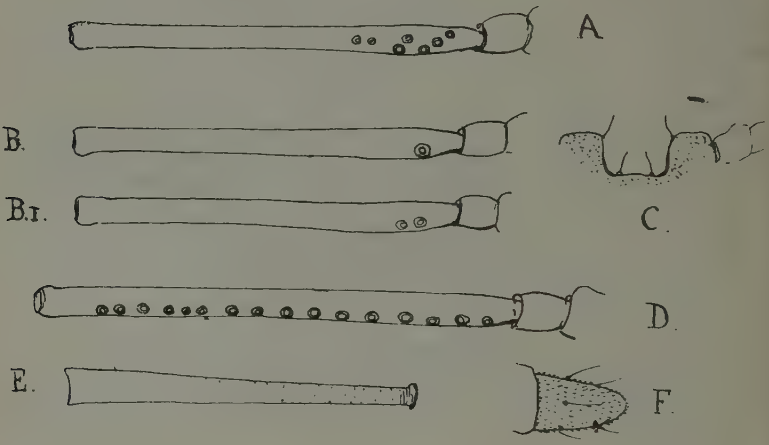

Fig. 182.

A. *Myzus primulæ* Theo. Segment iii of antenna of Apterous ♀; B. and B1. Segment iii. of *Myzus polyanthi.* sp. n. Apt. ♀; C. Head; D. Alate ♀ of *Myzus polyanthi*, 3rd antennal segment; E. Cornicle of Alate ♀; F. Cauda.

I transferred a number of apteræ on March 29th to a potted *Primula obconica*, and by the 3rd they had all settled down, and by the 7th four females had already started colonies under the leaves, one colony numbering 40. They seemed to prefer the dark and all collected on the lower leaves away from the light of the laboratory windows.

Myzus polyanthi sp. nov. resembles this insect, but the antennal sensoria differ in the alatæ and to some extent in the apteræ.

MYZUS POLYANTHI sp. nov.

Alate viviparous female. Head and thorax brown; thoracic lobes deep brown. Abdomen green, with dark transverse markings. Cornicles green, with slightly dusky apices. Antennæ green, apices dusky. Legs green, apices of femora, tibiæ and the tarsi dusky. Cauda and anal plate green. Closely resembling *Mysus primulæ* Theob., but differs in the antennal sensoria; segment iii. having a line of 10 to 17 sensoria along one side and there are none on iv. Cauda with 2 hairs each side and 1 on mid dorsal region. Wings normal.

Length 1.5 to 1.8 mm.

Apterous viviparous female. Green and very similar to *M. primulæ*, but antennal segment iii. has only 1 to 2 round sensoria near base, whilst *M. primulæ* has a group of 5 to 8.

Length 1.2 to 1.7 mm.

FOOD PLANTS. *Polyanthus sp*; *Primula vulgaris*; *Auricula sp.*; *Lysimachi sp.*

LOCALITIES. Ledbury, 27.v. 15; Hollington, near Hastings, 17 vii. 14 (F.V.T.); Stowting, near Hythe, Kent, 27 iv. 14 (Duffield); Bangor, v. 23 (Walton); Aberystwyth, iv. 23 (Walton).

Observations. Apparently a common species where it occurs on both cultivated and wild *Primula*, and in gardens on *Polyanthus* and *Auricula*. It is closely related to *primulæ*, but the apterous female has only 1 to 2 sensoria on antennal segment iii., and the alatæ 10 to 17, not 35 to 40.

MYZUS GRACILIS Buckton.

Mono. Brit. Aphid., I., 176 (1875).

"*Alate viviparous female.* Pale green. Head and thorax together as long or longer than the abdomen. Head small and brown. Antennæ rather short. Frontal tubercles obvious. Ocelli distinctly marked. Prothorax large, with a brown rhomboidal-shaped band. Mesothorax much developed. Three thoracic lobes, small and pointed anteriorly. Scutellum brown.

Abdomen oval, with a few faint cross-streaks of brown. Cornicles cylindrical and very thin. Tail fine. Legs moderate; tibial joints and tarsi brown. Wings ample. Cubitus and insertions green. Stigma grey, veins dark brown. Found on Sycamore in company with *Chaitophorus aceris*, early in November at Shottermill, near Liphook.

"*Length* 2.54 × 1.01. Wing expanse 8.10 mm.

"*Winged Male.* Bright ochreous yellow. Thorax largely developed. Abdomen small. Head, band on prothorax, thorax and pectus rich brown. Also a patch below the wing insertions rich brown. Abdomen with brown transverse bands and five or six dots on each carina. Tail small. Genito-anal valves large. Antennæ black. Wings as in winged female. Several of these males were found in November mixed with the preceding females, herding also with individuals of *Chaitophorus aceris*."

Regarding this species Mr. Laing sends me the following note:

Alate viviparous female: Antennal segment iii. with 20-22 round, contoured sensoria nearly its whole length, and mainly along one side; proportions of segments 7, 4, 32, 23, 20 (8 + spur which is broken off short). Cornicles cylindrical slightly expanded at base, imbricated, equal in length to segment v. of antenna. Cauda with 3 hairs one side, four the other, and 2 dorso-apical. Antennal tubercles very moderately developed.

Alate male: Antennal segment iii. with 50-55 sensoria along its whole length, very slightly tuberculate; 0 on iv., and about 14 on the *apical* two-thirds of v.; proportions of segments 6, 5, 38, 26, 20 (7 + spur which is broken off). Cornicle equal in length to v.

Myzus impactus Walker.

Aphis impacta Walker.

Zoologist, VII., p. xlviii., App. (1849).

Alate viviparous female. Head deep olive-green to deep brown; thorax black; abdomen yellowish-brown, with a dark central disc and dark lateral spots; antennæ dark except base of segment iii.; cornicles dull yellow; cauda yellow to dusky;

legs same colour as body, with dark apices to femora and tibiæ, and the tarsi dark. Antennæ longer than body; segment i. much larger than ii.; iii. longer than iv., with a row of 9 to 11 sensoria on the basal three-quarters; iv. a little longer than v.; vi. with flagellum longer than iii. Rostrum reaches to second coxæ; dusky at apex. Cornicles thin and cylindrical, about as long and a little thicker than antennal segment iv. Cauda a little more than a quarter the length of the cornicles, acuminate, spinose, 3 hairs each side. Anal plate small, rounded. Femora with a few, tibiæ with many hairs.

Length 2 to 2.3 mm.

Apterous viviparous female. Green, apices of antennal segments iii. to v. dusky; vi. dark; also apices of tibiæ and tarsi. Eyes red. Antennæ longer than body; segment i. larger than ii.; iii. a little longer than iv., with 3 to 5 sensoria on base; iv. a little longer than v.; vi. with flagellum about as long as iii. Rostrum reaches to second coxæ. Cornicles thin, cylindrical, about as long as segment iv. of antennæ, apices dusky. Cauda green.

Length 2.5 mm.

FOOD PLANT. Elder (*Sambucus nigra*).

LOCALITY. Bangor, North Wales, 11 vi. 23 (Walton).

Observations. I have placed this as Walker's *impacta* as it answers so closely to his imperfect description. It occurred with *Aphis sambucaria* Passerini and *Anuraphis exul* Walker, and also many immature Macrosiphum. Nymphæ were also present of this species. Walker's original description of *impacta* is as follows: "*Winged viviparous female.* The body is black; the abdomen is yellowish-brown; its disc is mostly black and it has a row of black spots on each side; the antennæ are black and longer than the body; base of third joint is yellow; the rostrum is dull yellow, with a black tip; the tubes are also dull yellow and rather more than one-sixth of the length of the body; the legs are yellow and rather long; the thighs from the middle to the tips, the tarsi and the tips of the tibiæ are black; the wings are colourless; the squamulæ and the costal veins are pale yellow; the stigmata and the other veins are pale brown. Found with *A. picta* in the middle of September near Newcastle by Mr. Hardy."

MYZUS LYTHRI Schrank.

Aphis lythri Schrank.
Myzoides lythri Van der Goot.

Schrank, Fn. Boica., II., 115, 1215 (1801); Kaltenbach, Mono. Pflanz., 51, 36 (1843); Walker, Ann. Nat. Hist., Se. 2, V., 389, 83 (1851); Amyot, Ann. Soc. Ent. Fr., Se. 2., V., 477; Walker, List. Hom. (B.M.), IV., 990, 91 (1852); Schouteden, Ann. Soc. Ent. Belg., XII., 232, 7 (1906).

Apterous viviparous female. Green; somewhat oval; tarsi brown; eyes dark; legs pallid. Antennæ shorter than body; pale green, sometimes a dusky spot on segment vi.; i. longer than ii.; iii. longer than iv., nearly as long as iv. + v.; iv. slightly longer than v.; vi. about as long as iv. + v., basal area half as long as flagellum. Rostrum yellow, dusky at apex, broad, reaching to third coxæ, some not quite. Cornicles pale yellowish-green, cylindrical, in some tapering apically, long, about as long as mid tibiæ, faintly imbricated. Cauda less than one-third length of cornicles, pale yellowish, more or less triangulate, 3 pale hairs each side. Legs rather short; tibiæ with a few short hairs each side. The skin is remarkably rugose in this stage.

Length 1 to 1.9 mm.

Alate viviparous female. Black; abdomen green, with dark median and lateral markings. Cornicles long, rather thick, black. Cauda reddish-brown to almost black. Legs black, base of femora and most of tibiæ dull yellowish. Antennæ black; segment iii. dark yellow basally. Eyes deep red. Head and thorax shiny black; pronotum brownish. Wings normal. Antennæ not so long as body; segment i. much longer than ii.; iii. long, as long as iv. + v., with a line of 11 to 14 round sensoria one side; iv. longer than v.; base of vi. a little more than half v.; flagellum nearly four times as long as base. Frontal median and lateral cephalic processes prominent. Rostrum reaches to second coxæ. Cornicles narrow compared to many species, cylindrical, imbricate, about two-thirds length of antennal segment iii. Cauda triangulate, less than one-third to nearly half length of cornicles; 3 hairs each side. The dark lateral areas of body with fine short spines and some short hairs arising from pale round spots.

Length 1.7 to 1.9 mm.

Food Plant. Purple Loosestripe (*Lythrum salicaria*).

Localities. Wye, 4 to 21 vii. 11 (F.V.T.); Southgate, 24 viii. 47 (Walker); Edmonton, Tottenham (Walker); Belgium (Schouteden).

Observations. This seems to be an uncommon species. I have looked for it everywhere I have been and have only found it once at Wye, where it swarmed on the tops of the flower-spikes of the Purple Loosestripe, and a few on the leaves in July; most were nymphæ, larvæ and apteræ, only one alate female. Walker's specimens in the Irish Museum and in the British Museum are all alatæ and mature apteræ.

Myzus pseudolamii Theobald (nov. nom.).

Macrosiphum lamii Theobald (non *lamii* V. d. Goot).

Theobald, Entomologist, XLVII., 274 (1915).

Alate viviparous famale. Head and thorax yellowish-green to yellow; thorax with brownish lobes. Abdomen bright green in front, yellow to orange posteriorly; with rather indistinct dark green lateral spots. Venter green; mesosternal plates pale brown. Antennæ longer than body, dark brown; base of segment iii. pale. Cornicles pale, dark at apex. Legs fawn coloured, apices of femora, tibiæ and the tarsi black. Wings with dark brown veins and stigma. Antennæ arising from prominent frontal processes, segments i. and ii. pale; i. longer than ii.; iii. longer than iv., with 13 to 16 sensoria more or less in a straight line and more or less extending to apex; iv. longer than v.; vi. not as long as iv. + v. Rostrum green, reaching to second coxæ, apex black, rather thick. Cornicles narrow, cylindrical, shorter than antennal segment iii., with 1 to 2 laterally branched transverse striæ at

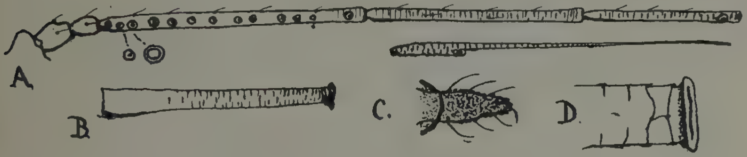

Fig. 183.—*Myzus pseudolamii* nov. nom.
Alate viviparous ♀. A. antenna; B. and D. cornicles; C. Cauda.

apices, rest imbricated. Cauda green, prominent, with 3 pairs of lateral hairs and 1 median and dorsal near apex, less than one-third length of cornicles.

Length 2 mm.

FOOD PLANT. Red Lamium (*Lamium purpureum*).

LOCALITIES. Wye, 8 vi. 14; Abingdon, 7 vii. 16 (F.V.T.).

Observations. Described from many alate viviparous females, which were found producing young in isolated colonies. The larvæ varied from pale to deep green. No apterous viviparous females could be found. The insects were taken amongst the flowers and under the leaves. I originally described this as a *Macrosiphum*, but it now seems to me to come nearest *Myzus*. As Van der Goot has described quite a distinct species as *Myzus lamii*, it is re-named.

MYZUS CHELIDONII Kaltenbach (non Buckton).

Aphis chelidonii Kaltenbach.

Kaltenbach, Mono. Pflanz., 43 (1843); Theobald, Journ. Eco. Biol., VIII., No. 3, 1. 37 (1913).

Alate viviparous female. Green; thoracic lobes, pronotum and scutellum brown. No markings on the green abdomen. Cauda and cornicles green to greenish-yellow. Anal plate yellowish. Antennæ as long as the body, brown, base of iii. yellow. Eyes red. Rostrum reaches second coxæ, green to yellow, apex dark. Some show grey meal on abdomen. Cauda about one-third of cornicles. Segment i. of antennæ longer than ii.; iii. longer than iv., with 6 to 8 sensoria; iv. a little longer than v. Cornicles imbricated. Legs green, apices of femora and tibiæ dusky; tarsi dark.

Length 2.2 to 3 mm.

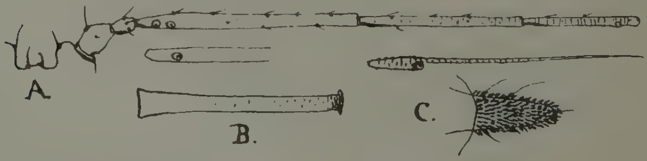

Fig. 184.—*Myzus chelidonii* Kaltenbach.
A. Head and antenna of Apterous viviparous ♀; B. Cornicle; C. Cauda.

Apterous viviparous female. Green to dull yellowish-green, dull in appearance. Cornicles long, pallid, almost white. Cauda pallid, about one-third of cornicles, with 2 hairs each side. Antennæ as long as body, brownish, pale at base. Eyes red. Rostrum pale, almost white, apex dark, reaching to second coxæ. Abdomen wholly green, dull, domed ; head paler. Apices of femora and tibiæ brown ; tarsi brown. Antennal segment i. larger than ii. ; iii. longer than iv., with 0 to 3 basal sensoria ; iv. a little longer than v. ; vi. dusky. Cornicles imbricate.

Length 2 mm.

FOOD PLANT. Greater Celandine (*Chelidonium majus*) ; Hops (*Humulus lupulinus*) ; *Arctium lappa.*

LOCALITIES. Wye, vii. 20 ; Little Hadham, vii. 17 ; Guildford, 20 vi. 13 ; Faversham, vi. 25.

Observations. An uncommon species, very like several other green *Myzius*, but I think distinct, the non-ornate body of the alate female separates it from *convolvuli.* The cauda has only 2 hairs each side. My *gei* and *mercurialis* are closely allied to it, if not the same. Buckton's alate *chelidonii* is not Kaltenbach's, for it has dark cornicles and is apparently my *rubifolium.*

MYZUS VERONICELLUS nov. nom.

Macrosiphum veronicæ Theobald.

Journ, Eco. Biol., VIII., 93 (1913).

Alate viviparous female. Head and thorax pale yellowish-brown, the former paler than thorax, with two black spots, one near each eye. Eyes very dark red. Antennæ dark brown ; segments i. and ii. same colour as head ; longer than whole body. Abdomen rather swollen, bright, shiny, apple green. Cornicles long, thin, green, with black apices. Cauda green, moderately long. Legs green to pale greenish-brown, apices of femora and tibiæ and the tarsi dark. Rostrum green, dark at apex ; not quite reaching second coxæ. Thoracic lobes dark brownish. Wings normal ; stigma grey. Segment i. of antennæ larger than ii. ; iii. longer than iv., with 11 sensoria in a line on basal two-thirds ; iv. a little longer than v. ; base of vi. about half v.

Length 1.9 to 2 mm.

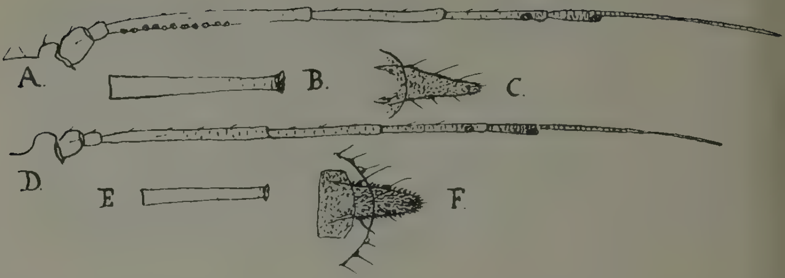

Fig. 185.—*Myzus veronicellus* Theobald.
A. Antenna of Alate ♀; B. Cornicle; C. Cauda; D. Antenna of Apterous ♀; E. Cornicle; F. Cauda.

Apterous viviparous female. Pale brownish-green, somewhat shiny, head paler than body. Antennæ longer than body, pale at base, darkened towards apices. Segment i. larger than ii.; iii. longer than iv.; iv. and v. about equal. Legs pale, slightly dusky at apices of femora; black at apices of tibiæ and all the tarsi. Cornicles long, thin, pale, apices dark. Cauda green, about half length of cornicles. Eyes black. Hairs on head and basal segments of antennæ capitate. Legs hairy, some hairs minutely capitate. Body nude, except at apex.

Length 1.4 to 1.9 mm.

Larvæ. Green and shiny, legs dusky to pale green or pale green at bases. Cephalic hairs capitate. Skin shiny and wrinkled as in adults. Antennæ dark, except two basal segments, which are deep greenish-brown.

FOOD PLANT. *Veronica beccabunga.*

LOCALITIES. Wye, 22 v. 12; Lymington, 4 viii. 13 (F.V.T.); Windermere, 17 viii. 15 (R. Roberts).

Observations. Described from several alate and apterous females. The alatæ are very sluggish, the apteræ more active, the latter produced many young, which surrounded them. All were feeding amongst the flower heads. I could only find a few colonies in a mass of this plant growing near the river Stour at Wye. Later I came across a few alatæ at Lymington, and Mr. Rymer Roberts sent me specimens from Windermere in 1915. At first I took it to be Koch's *beccabungæ*, but it is not so, and comes, I think, in *Myzus*, more certainly than in *Macrosiphum*. It is certainly not Walker's *A. veronicæ*. Zoologist, VI., 2248 (1848), which he describes as follows: "*The wingless viviparous female.* The body is very small, oval, convex, smooth, shining and of a very dark olive colour or almost black; there is a rim on each side of the body; the antennæ are black, slender, setaceous and more than half the length of the body; the eyes are dark brown; the rostrum is black; the tubes are also black and nearly one-quarter the length of the body; legs dark green of moderate length. The young are like the mother, but duller, flat and linear; colour when very young is dark green. Near London in spring, it disappears soon after the beginning of summer. On Germander (*Veronica chamædrys*)." A slide of Walker's *Veronicæ* is in the Hope Museum, Oxford. It seems to me, says Mr. Laing, to consist of a mixture of *Hyadaphis xylostei* and *Cavariella capreæ*. Nor can I make it tally with *Myzus veronicæ* Del Guercio (Nuov. Relaz. Staz. Agri. Fir., II., 151, 1900) on *Veronica sp.* This insect I originally described as *Macrosiphum veronicæ*; it comes in *Myzus* and I have re-named it *veronicella*.

MYZUS GEI Theobald.

Entomologist, LII., 157 (1919).

Alate viviparous female. Green. Antennæ longer than body to same length; segments i. and ii. green, remainder brown. Eyes large and black. Cornicles green, long, thin, cylindrical, dusky at apices. Cauda pale green. Legs long and thin; green except at apices of tibiæ; tarsi dark. Rostrum green, apex dark. Antennal segment i. larger than ii.; iii. longer than iv., with 12 to 14 sensoria, more or less in a line, not quite reaching apex of segment; iv. a little longer than v., which has the usual sub-apical sensorium; vi. darkest, about as long as iv. + v.; basal area not half as long as v. Rostrum reaches past second coxæ; apical segment acuminate, longer and narrower than penultimate. Cornicles about as long as antennal segment iv., faintly imbricate, with a few transverse striæ at apex. Cauda wider than cornicles, a little more than half their length, four hairs one side, 3 the other and a sub-apical one; base expanded. Anal plate green, A few short hairs on tibiæ and one or two near apex of femora. Wings with pale greenish brown stigma and pale brown veins;

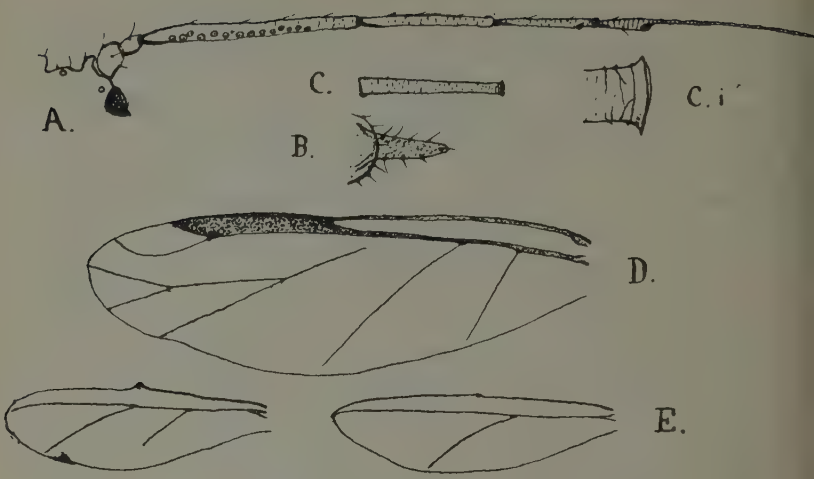

Fig. 186.—*Myzus gei* sp. nov.

A. Head of Alate ♀ and antenna ; B. Cauda and anal plate ; C. Cornicle ; C.i. apex further enlarged ; D. Front wing ; E. Hind wings.

hind wings with 1 or 2 oblique veins. Venation somewhat marked (*vide* figure).

Length 1.5 mm.

Food Plant. Wild Avens (*Geum urbanum*).

Locality. West Wood, near Hythe, Kent, 4 vi. 15.

Observations. Only alate females were found, each surrounded with many small pale green larvæ, the latter with antennæ of five segments ; iii. and v. darkened apically. The venation is some what marked ; some with one oblique vein on one wing, the normal two on the other. I fancy I found this insect in August, 1925, in the New Forest, but mislaid the specimens.

Myzus mercurialis Theobald.

Entomologist, LII., 158 (1919).

Apterous viviparous female. Pale to bright green ; antennæ darkened, except at bases. Cornicles dusky at apices. Tibiæ with dark apices. Tarsi dark. Eyes red. Antennæ a little longer than body ; segment i. much larger than ii. ; iii. longer than iv., with a single sensorium near base and with the second hair on each side capitate ; iv. a little longer than v. ; vi. not quite so long as iv. + v., its basal area not half length of v. Cornicles thin, cylindrical, very little thicker than antennal segment iii. and about as long ; 2 striæ at apices. Cauda greenish-yellow, about half length of cornicles, spinose at edges, with flattened sculpturing on the surface ; 3 hairs each side and 1 sub-apical. Tibiæ with a few scattered short pale hairs. Rostrum green, apex dark, rather broad and just reaching third coxæ.

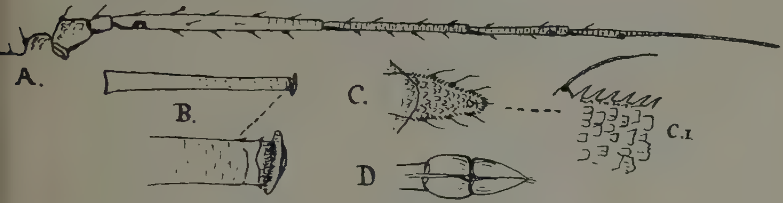

Fig. 187.—*Myzus mercurialis* sp. nov.
A. Antenna of Apterous viviparous ♀ ; B. Cornicle ; C. Cauda ; C.1. further enlarged surface ; D. Apex of rostrum.

Length 1.5 to 2 mm.

FOOD PLANT. Dog's Mercury (*Mercurialis officinalis*).

LOCALITIES. Ventnor, Isle of Wight, 10. v. 11 ; Wye, 24 iv. 16.

Observations. An obscure green species found in abundance in both localities in the spring. The cauda is markedly spinose laterally, but has flattened sculpturing on the surface.

MYZUS EUPATORII Passerini.

Aphis eupatorii Passerini.

Aphid. Italicæ, 36 (1863).

Apterous viviparous female. Pallid yellowish-green ; apices of antennæ and rostrum dusky, also to some extent apices of cornicles ; tarsi slightly dusky. Eyes reddish-black. Antennæ longer than body ; segment i. much larger than ii., projecting inwards near apex ; iii. longer than iv., less than half vi. ; iv. and v. about equal in length ; vi. with basal area about half iv ; flagellum long, longer than iv. + v. Rostrum reaching nearly to third coxæ. Cornicles cylindrical, thin, about as long as antennal segment iv. ; *very* faintly imbricated. Cauda small, acuminate, about two-thirds length of cornicles, constricted at base and much wider than cornicles, finely spinose, with 2 hairs each side. Anal plate rounded, rather flat, with 6 apical, rather long hairs, finely spinose. Hairs on head rather short and thin, simple. Legs rather long and thin, a few hairs on tibiæ.

Length .5 to .9 mm.

FOOD PLANT. *Eupatorium cannabinum.*

LOCALITY. Sandwich, ix. 22.,

Observations. A few apteræ of this small delicate species were found in the flower-heads and their stalks by Sir Charles Langham, Bart., and sent alive to me.

The original description is as follows: "*Femmina aptera.* Ovoto oblonga, convexa, postice acuta; luteo-virescens. Antennis luteolas, apice fuscis, corpus subæquantibus. Oculi rubro-fusci. Rostrum luteolum apice fuscum. Pedes posticos excedem. Nectaria liteola, apice fusco, basi paullo incrassata. Cauda lutea, nectariis dimidus longior. Pedes luteoli. Long. $\frac{1}{3}$ to $\frac{1}{4}$ ". *Nymphæ.* Apteris similis, interdum viridiones, alarum apices fuscis. In pedunculus et circa flores. *Eupatorii cinnabinii.* Augusto."

MYZUS MYRMECOPHILUS Theobald.

Macrosiphum myrmecophilum Theobald.

Entomologist, XLIX., 49 (1916).

Apterous viviparous female. Bright green. Antennæ as long as body; segment i. larger than ii.; iii. longer than iv., with one sensorium near base; iv. very little longer than v.; vi. a little shorter than iv. + v., its basal area about one-fifth length of flagellum; on i. to v. a few short hairs, slightly swollen apically. Rostrum rather short and broad, not quite reaching second coxæ, apex dark. Eyes large, black. Two incurved capitate hairs in front. Legs green; tarsi faintly dusky; hairs short, pale. Cauda green, more than half cornicles, prominent, 3 pairs of lateral hairs and one median sub-apical. Cornicles green, cylindrical, slightly expanding basally; about one-fifth length of body. Anal plate green.

Length 2 mm.

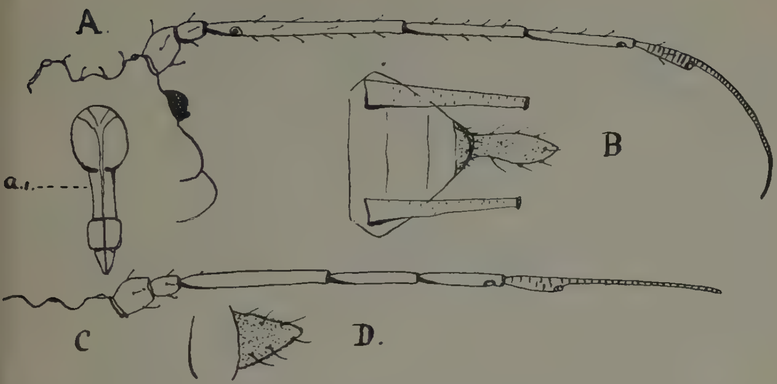

Fig. 188.—*M. myrmecophilus* Theobald.
Apterous ♀. A, Head and antenna ; A.1, Rostrum ; B, Cauda and Cornicles ; C, Head of nymph ; D, Cauda of larva.

Nymph. Bright green, except tarsi and segments iv. to vi. of antennæ, which are brown ; iii. much longer than iv. ; iv. a little longer than v. ; vi. much longer than iv. + v., its basal area about one-fourth the length of the flagellum. Rostrum not reaching the second coxæ, dark at the tip. The frontal lobes not nearly as marked as in the apterous females.

The larva is dull green ; tarsi, apices of antennæ and cornicles dusky. Antennæ shorter than body ; frontal lobes not as prominent as in the adult ; segments relatively shorter. Cauda triangulate. Eyes black.

LOCALITIES. Hurlstone Point, Porlock, Somerset, 8 v. 15, with *Lasius niger* (Crawley) ; Rossleigh, Co. Kerry, Ireland, vi. 1902, with *L. niger* (Donisthorpe).

Observations. Mr. H. Donisthorpe sent me a single much-damaged female, which I originally placed in the genus *Macrosiphum*, but I was then unable to fully describe it. More recently Mr. Crawley sent me a perfect apterous female, nymph and mature larva, also taken in a nest of *Lasius niger*. The species comes very near *Macrosiphum*, in which I originally placed it, but the cephalic structure I find by the new specimens places it nearest *Myzus*. The single sensorium on segment iii. of the antennæ, the caudal structure and the rugose skin, place these ant nest specimens I feel sure together. The only difference is that in

Donisthorpe's specimens, the rostrum reaches the second coxæ. Koch (Die Pflanz. Aphid., 155, 1854) described a subterranean *Macrosiphum* from the roots of *Senecio jacobæa*—an apterous female, but it is not in any way connected.

MYZUS ERIGERONIELLA sp. nov.

Apterous viviparous female. Green; antennæ dark except base of segment iii. and i. and ii.; i. much larger than ii.; iii. with 6 to 9 sensoria on basal half; iv. and v. about equal; vi. with basal area about quarter flagellum. Rostrum with dusky apex, reaching to second coxæ. Eyes deep red. Cornicles green to deep olive green, not quite so long as iii., apex with 1 to 2 striæ.

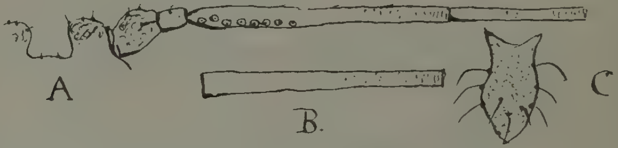

Fig. 189.—*Myzus erigeroniella* sp. nov.
Apterous ♀.
A. Head and antenna; B. Cornicle; C. Cauda.

Cauda green to dark green, about half length of cornicles, with 3 hairs each side and 3 dorso apical. Legs deeper green than body, apices of tibiæ and the tarsi dark. Body with scattered very short hairs. Cephalic and antennal hairs capitate. Tibiæ with many spine-like hairs, especially apically.

Length 2 to 2.3 mm.

FOOD PLANT. Fleabane (*Erigeron acris*).

LOCALITIES. Littlestone, vi. 25 (A. Duffield).

Observations. Easily demarked from other green *Myzus* by the more numerous sensoria on antennal segment iii. The caudal hairs are sometimes 4 each side, and 1 or 2 dorso-apical ones.

MYZUS LONGIPENNIS Buckton.

Siphonophora longipennis Buckton.

Buckton, Mono. Brit. Aphid., I., 146 to 148, pl. XXI. (bis) (1875); Theobald, Journ. Eco. Biol., VIII., 118, fig. 33 (1913).

Apterous viviparous female. Yellow to yellow-green, marked with rusty to red; elongate oval, in some, somewhat widened behind and narrowed towards tail. Antennæ thin, yellow, not quite so long as body ; apices of segments iv. and v. dusky ; vi. dusky ; iii. longer than iv. ; iv. longer than v. ; vi. as long as iv. + v. ; iii. with 1 to 2 sensoria at base. Eyes large, black to deep red. Legs pale yellowish-green ; tarsi dusky ; tibiæ with many short hairs. Cornicles moderately long, pale yellowish to yellowish-green, slightly dusky at apex ; faintly imbricated. Cauda rather long, pale yellowish, lanceolate.

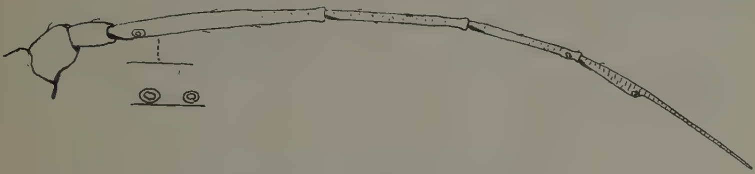

Fig. 190.—*Myzus longipennis* Buckton.
Antenna of apterous female.

Length 1.5 to 2 mm.

Buckton describes the pupa and alate female as follows : "*Pupa.* Yellow. Head somewhat broad, with brown spots in the position of the stemmata. Prothorax with a carnation band or ring. Thorax and wing cases pale yellow, the latter having strongly marked brown tips. Abdomen acuminate. Dorsum stained with carnation. Pore marks red, with several carnation bands transversely connecting them. Tail yellow. Nectaries green and straight. Legs almost colourless. Femora nearly as long as the tibiæ. Eyes red. Antennæ short, green, and seated on prominent frontal tubercles.

Length 1.77 mm."

Of the two alate specimens on the slide one has the cornicles straight and the other has them distinctly clavate (F. Laing).

"*Alate viviparous female.* Body almost linear or fusciform. Colour very much as in the pupæ, except that the abdomen is free from the red pore marks and bands. Thoracic lobes pale yellow. Tail pointed and yellow, about one-third the length of the cornicles, which are green, straight and cylindrical. Antennæ pale green with darker tips. Frontal tubercles small. Legs almost white, with tibiæ and femora of nearly equal length. Eyes reddish brown. Stemmata red. Wings ample, hyaline and greenish, rather corrugated and finely punctured. Insertions, cubitus, stigma and veins delicate green.

Length 2.02 mm."

Antennæ with iii. with 10-12 sensoria at equal intervals along whole length and on one side; proportions of segments 6, 4, 28, 20, 19 (8 × 32). Cornicle subequal to iv. Antennal tubercles very similar to those in *Myzus persicæ* Sulz. (Laing).

"*Male.* Winged. Head, thoracic lobes, neck rings, tips of femora and tibiæ rich brown. Tarsi nearly black. Antennæ seated on well-developed frontal tubercles, which are somewhat porrected as in the genus *Myzus*. Abdomen brick red, with brownish or grey transverse cloudings. Wings longer even than in the alate female.

Length 1.7 mm."

Antennæ with about 25 sensoria on iii., none on iv., 1-2 about middle of v.; proportion of segments 6, 5, 34, 20, 21 (6 + incomplete spur): Cornicle straight, subequal in length to *iv*. (Laing).

Food Plant. *Poa annua.*

Localities. Norwich (Buckton); Great Salkeld (Britten); Romney Marsh, Kent (F.V.T.).

Observations. Buckton describes all stages of this insect, except the oviparous female, from Norwich, where it was found in numbers in October, feeding on the blades and flower-stalks of *Poa annua*. Larvæ and apterous females were sent me by Mr. Britten in July and I found two colonies in 1910 on Romney Marsh, on the same plant in June, but could not obtain any alatæ. It evidently lives all the year on that grass. It appears from the apteræ to come in the genus *Myzus* and not *Macrosiphum*.

Sub-Tribe PENTALONINA.

This sub-tribe is told by the wings having the radial sector more or less united with the upper branch of the media or the hind wings reduced.

The specialisation of the venation is peculiar and in one genus the hind wings are abnormally small. The veins are clouded. The species occur on tropical ferns and plants. Those found in this country are introductions.

The genera *Idiopterus* and *Pentalonia* occur in England. They tabulate as follows :

1. Hind wings much reduced in size, lacking at least the cubitus.
   The radial sector of fore wings fused with the upper branch of media forming a closed cell. *Pentalonia.*
2. Hind wings nearly normal in size ; media and cubitus present. *Idiopterus.*

Genus IDIOPTERUS Davis.

Fullawayella Del Guercio.

Ann. Ent. Soc. America, II., 3, 199 (1909) ; Del Guercio, Redia., VII., 462 (1911) ; Baker, Bull. 826, U.S. Dep. Agri., 60 (1922).

Wings with marked venation (*vide* fig. 191) ; somewhat irregular. The radial sector of fore wings extends abruptly downwards from the stigma and paralleling the upper branch of the media with which in some specimens it appears to be almost united and a triangular closed cell is formed in some specimens. The hind wings have both media and cubitus present. The head has prominent antennal tubercles, which project inwards and are gibbous. The antennæ are longer than body, of six segments ; the first gibbous like the antennal tubercles ; the sensoria of the alatæ sub-circular. The cornicles are cylindrical, moderately long and thin. Cauda rather small, conical, but prominent. Body of apteræ tuberculate. Legs rather long. Of delicate and fragile appearance.

A single species only known, feeding on various Ferns.

IDIOPTERUS NEPHRELEPIDIS Davis.

Macrosiphum kirkaldyi Fullaway.
Fullawayella kirkaldyi Del Guercio.

Davis, Ann. Soc. Ent. Am., II., 3, 199 (1909) ; Fullaway, Rept. Hawaii. Agri. Exp. Sta., 22 (1910) ; Essig., Pomona Journ. Ent., III., 3, 538 (1911) ; Theobald, Entomologist, XLVIII., 258 (1915) ; Blanchard, Physis. VI., 21, 46, fig. 16 (1922) ; Laing, Ent. Mo. Mag., IX., 3rd Se., 241 (1923).

Alate viviparous female. Black to dark olive-green ; head brown to deep olive-green, in some black. Thorax nearly black.

Abdomen somewhat paler than head and thorax, brownish-green to deep olive green ; segments marked. Antennæ longer than body, almost white, except segments i., ii. and vi., which are black and apices of iii. to v. black ; segment i. larger than ii. ; iii. longer than iv. ; iv. slightly longer than v. ; vi. the longest ; iii. with 9 to 11 round sensoria along its whole length ; iv. with 1 to 3 sensoria ; v. with 2 to 3 and a large sub-apical one ; very few hairs arise from the prominent frontal tubercles. Legs long and delicate, transparent to transparent white ; tips of femora, tibiæ dark ; tarsi and coxæ black ; a few hairs on legs. Cornicles moderately long, cylindrical, somewhat expanded basally, basal one-third dark, rest white. Cauda ensiform, olive-green to black, about half length of cornicles. Anal plate, black ; slightly hairy. Wings with marked venation, as shown in figures, veins clouded along their sides.

Length 1.4 to 1.6 mm.

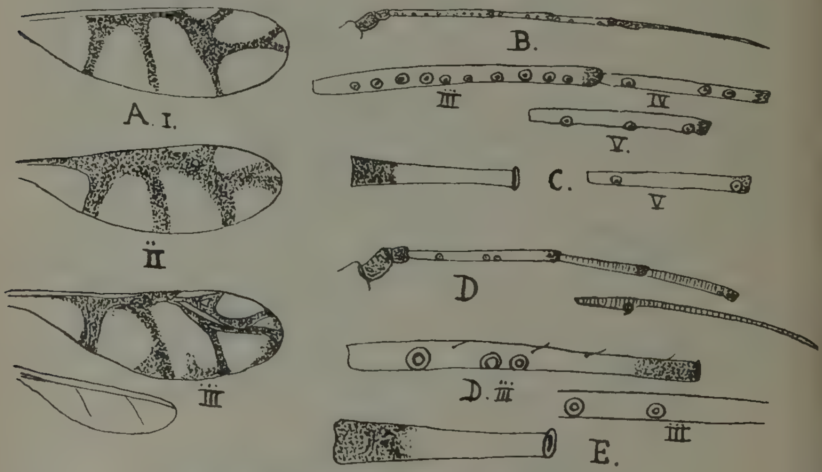

Fig. 191.—*Idiopterus nephrelepidis* Davis.
Alate ♀ A.I. to A.III Wings ; B. Antenna ; III.—V. Segments further enlarged ; C. Cornicle ; D. Antenna of apterous ♀ ; D. iii, further enlarged segment iii ; E. Cornicle.

Apterous viviparous female. Black to deep olive-green, the back with six rows of small tubercles, the tubercles of the two median rows each with two white capitate hairs ; several similar hairs on head and frontal tubercles. Antennæ longer than body, similar in colour to alate female; segment i. larger than ii.; iii. longer than iv.; iv. slightly longer than v.; vi. longest ; on iii. one large and two small round sensoria, the former basal, latter close to it, or two basal ones only; a few short hairs. Legs long, slender, transparent white, except tips of tibiæ and the tarsi, which are black; hairy. Cornicles white, basal quarter black, cylindrical, somewhat widening basally. Cauda ensiform, about half length of cornicles. Rostrum reaching just past third coxæ, transparent white, except at base, which is black.

Length 1.3 mm.

FOOD PLANTS. Various Ferns, including *Polypodium; Nephrelepis exaltata; Pteris spp.*; Sword Ferns (Davis); Violets, cultivated; *Acrostichium reticulatum* (Fullaway).

LOCALITIES. London area under glass, 20 viii. 15; Wareham, Dorset, xi. 24; Darwen, Lancs., 24; Manchester, 9. iii. 22; Whitby, Yorks., v. 23 (F.V.T.); Edinburgh, N.B., Sept. to Oct., 21 (Evans); Laing records it from Torquay, Hendon, Wisley, Jersey, Aberdeen, and says he has found it not uncommonly in London florists' shops. Chicago (Davis); Santa Paula, California (Essig); Claremont, California; Hawaiian Islands (Fullaway); Argentine (Blanchard).

Observations. This beautiful, delicate species (fig. 192) was described by Davis from America. It was first sent me by Mr. Gough in August, 1915. It was found swarming in some fern houses near London. One grower wrote me on October 7th of that year that

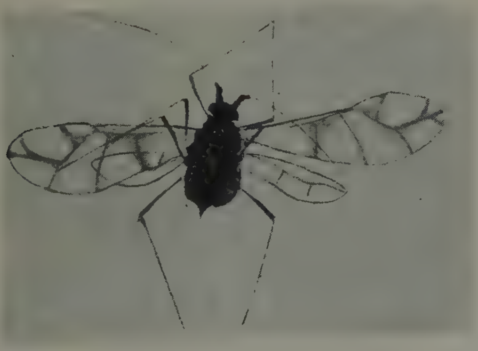

Fig. 192.—*Idiopterus nephrelepidis* Davis.

it had quite blackened the tops of the ferns and did a great deal of damage. In this instance they were feeding on *Polypodium*, but in the Laboratory at Wye College I found that they spread to *Pteris* and *Adiantums*. These plant lice cause the leaves to curl up, and in the case of the attack on Maiden Hair Ferns the plants were killed. Those I kept continued to breed all the year round and five alate generations were obtained. No sexual forms occurred at the end of the second year. If the attacked ferns were taken away from their muslin coverings, the alate females flew away rapidly to the light. Evans, who found this insect in his conservatories at Edinburgh, said it occurred on all manner of ferns, both tropical and British. It is one of the most beautiful Aphides when alive ; in certain lights the white spots on the bodies of the apteræ appear a metallic silver. Essig writes of this aphid as follows : " Davis first obtained this species from greenhouses in Chicago, where it had no doubt been imported from other places. Since his description was published, Fullaway, of the Hawaii Agricultural Experiment Station, has described what I believe to be the same species from the Hawaiian Islands. It is, possibly, a native of those islands, and has been imported into the larger greenhouses on the Pacific Coast and from there to various parts of the United States. It is as yet a rare species, and a very beautiful one. Davidson collected it in the central part of the State, and J. Neus collected it on the Pomona Campus at Claremont, California."

Blanchard records it from the Argentine on wild and cultivated ferns and says it is often a serious pest.

It seems to be widely distributed in Great Britain, no doubt being spread on plants from nurseries. So far it has only been found here under glass and on ferns indoors. The wing venation and the antennal sensoria are subject to much variation. It is evidently not a recent introduction for Laing finds a slide of it in Buckton's collection.

Genus PENTALONIA Coquerel.

Ann. Soc. Ent. France, Se. 3, VII., 259 (1859) ; Baker, Bull., 826, U.S. Dep. Agri., 6 (1922).

A very specialised genus, but closely related to *Idiopterus*. The antennæ are normal, of six segments, and with circular sensoria, segment i. gibbous. Head with prominent antennal tubercles, which project inwards, especially in the apteræ. Cornicles prominent and constricted near middle. Cauda small, elongate, sub-conical and to some extent constricted near middle. Wings marked ; fore pair with radial sector extending abruptly downwards and meeting upper branch of media, with which it fuses, but is diverted again towards its natural course near apex of wing. A closed cell is thus formed by the radial sector and the media, but at the margin of the wing there are the same veins as in the Aphidini. The much reduced hind wings are very characteristic and there is no cubitus. A single species only known, *P. nigronervosa.*

PENTALONIA NIGRONERVOSA Coquerel.

Coquerel, Ann. Soc. Ent. France, 259 (1859) ; Wilson, Journ. Eco. Ent., II., 346 (1909) ; Fullaway, Ann. Rept. Hawaii Agri. Exp. Sta., 29 (1910) ; Takahashi. Aphid Formosa, pt. 2, 89 (1923) ; Moreira, Bol. 2. Inst. Biol. d. defensa Agri. 28 (1925).

Alate viviparous female. Reddish-brown ; antennæ, cornicles, apices of femora and tibiæ dark red to brown, rest of legs pallid red, almost opaque, fragile. Eyes red. Antennæ longer than body. Cornicles about as long as antennal segment iii., cylindrical but constricted in middle, imbricate. Segment i. of antennæ larger than ii. ; iii. equal to iv. + v., with 10 to 14 round sensoria in an irregular line ; iv. a little longer than v., with 6 sensoria,

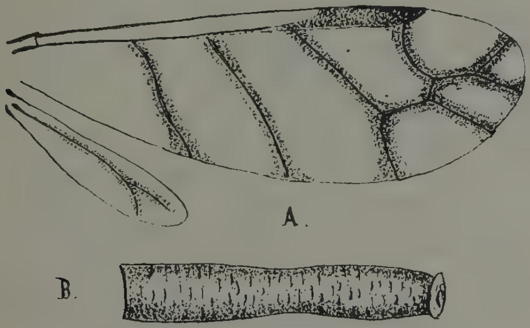

Fig. 193.—*Pentalonia nigronervosa* Coquerel.
A. Wings ; B. Cornicle.

3 usually near middle and 3 near distal end ; basal area of vi. small ; flagellum long. Cauda short and ending in a more or less globular tip. The marked wing veins are bordered with a dusky hue. Hind wings very small, not nearly half the length of front ones.

Length 1.3 to 1.6 mm.

Apterous viviparous female. Reddish-brown to pale reddish-brown. Cornicles dusky reddish-brown to deep red-brown. Apices of antennæ dusky, also of femora and tibiæ, other parts of same semi-transparent, with varied tints of pale red. Tarsi dark brown. Antennæ as long as body ; segment i. larger than ii. with a blunt process ; iii. longer than iv., iv. than v. ; basal area of vi. small, about as long as i. ; flagellum moderately long, about as long as iii. + iv. Cauda short, more or less rounded apically to ending in a globular tip. Cornicles relatively thicker than in alate female, but about same length.

Length 1.2 to 1.4 mm.

FOOD PLANTS. Bananas (*Musa sapientium*) ; *Alpinia rafflesiana* (Laing). *Alpinia speciosa* (Takahashi) ; *Arum maculatum* (Moreira).

LOCALITIES. Kew Gardens, iii. 22 (Laing) ; U.S.A. (Wilson) ; Bangalore, S. India (F.V.T.) ; Hawaii (Fullaway) ; Brasil (Moreira) ; Formosa (Takahashi) ; Bermuda, Trinidad, Egypt, Jamaica (F. Laing).

Observations. A very marked tropical Aphid feeding on Banana trees. It has so far only been found in Great Britain on *Alpinia rafflesiana* at Kew Gardens, and was recorded by Mr. F. Laing (Ent. Mo. Mag., LVIII., 164, 1922). Wilson in his redescription of this insect says that in America an ant, *Prenolepis parvula* Mayr, was an attendant on this Aphid in the greenhouse of the Department of Agriculture. The apteræ I have from Bangalore taken on *Musa sapientium*, are quite typical of Coquerel's species, but the cauda seems more of *Aphis* type, and not as mentioned here.

ADDENDA.

MACROSIPHUM SEJUNCTUM Walker.

Aphis sejunctum Walker.

Walker, Zoologist, VI., 2247 (1848).

Mr. F. Laing has mounted a carded specimen of Walker's *sejunctum*—an apterous female. It is very like *M. formicarium* (p. 118); the very marked cornicles being similar in both my alate *formicarium* and Walker's apterous *sejunctum*, but owing to the diverse positions in which they were found I have left them as distinct species until there is more evidence to show that they are the same.

Walker describes *sejunctus* as follows: " The body is greenish-yellow, mottled with bright red, rather large, oval, plump, smooth, shining; the antennæ are black, dull red at base and a little longer than body; the eyes are bright red; the mouth is pale red, its

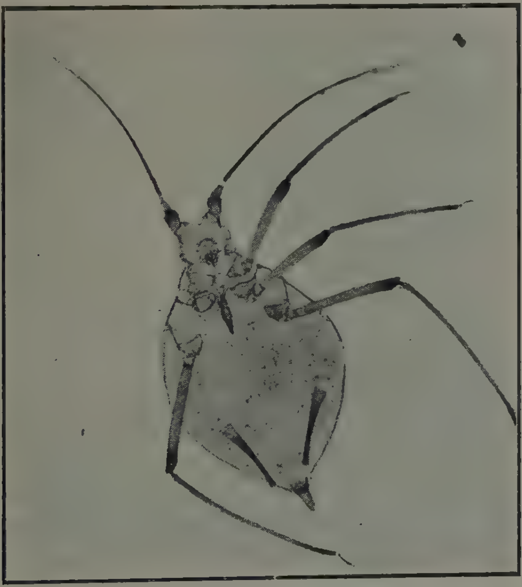

Fig. 194.—*Macrosiphum sejunctum* Wlk. Apterous viviparous ♀.

tip black ; the tubercles are black, yellow at the base and as long as one-fourth of the body ; the legs are yellow, long and hairy ; the tarsi and the tips of the femora and tibiæ are black. Near London, before the middle of June. Cedar of Lebanon (*Larix cedrus*)."

From the mounted specimen I add the following notes. " Antennæ a little longer than body ; segment i. much larger than ii. ; ii. cone shaped ; iii. long, not so long as the flagellum, with about 14 small round sensoria on basal half ; hairs thorn-like, arising from marked mammillæ, which look almost like sensoria ; iv. longer than v. ; iii. and iv. are dark ; v. and vi. paler. Rostrum reaches to third coxæ. Cornicles dark, nearly as long as segment iv. of antennæ, cylindrical, but much expanded basally, and again just at apex ; the apical half reticulate. Cauda dark, about half length of cornicles and projecting well beyond them ; three hairs each side and one dorso-apical. Head and body with many hairs. Legs also with many hairs.

The photograph reproduced here is of the specimen in the British Museum mounted by Mr. Laing.

APHIS LYCOPSIDIS Walker.

Zoologist, VI., 2219 (1848).

This is a *Macrosiphum*. Mr. Laing on mounting and clearing Walker's carded specimen finds that it is only Kirby's *M. granarium*. It must thus be added to the list of synonyms of that species. Walker found it on the Small Bugloss (*Lycopsis arvensis*). Type in the British Museum.

No one could have identified this from Walker's description.

PHORODON MESPILI Van der Goot.

Myzus mespili Van der Goot.

Tijds. v. Ent., XV., 64 (1912).

This species seems to me to come in *Phorodon* and not *Myzus*. It is closely related to *Phorodon cratægarium* Wlk., but differs in the much fewer sensoria on the antennæ of the alate female.

The following notes are made from specimens belonging to Mr. F. Laing, taken by Mr. O. G. Heath on Hawthorn at Cheam, Surrey (5. vii. 22).

Alate viviparous female. Antennal segment i. wider but scarcely longer than ii.; iii. a little longer than iv. with 30 to 36 sensoria of unequal size, over whole length; iv. very little longer than v., with 10 to 15 sensoria, mainly along one side; iv. with 0 to 3 (V. d. Goot says 0 to 5); base of vi. less than half v.; flagellum about five times as long as base. Frontal lobes projecting as short, blunt processes. Rostrum reaches to between second and third coxæ. Cornicles thin, pale, cylindrical, slightly expanding at base, about as long as segment iv., about two-and-a-half times as long as cauda. Head and thoracic lobes brown; abdomen bright green to green; antennæ brownish-black. Cleared specimens show iii. and iv. darkest. Legs same colour as body, apices of tibiæ and the tarsi dark. Cornicles and cauda bright green.

Length 1.8 to 2 mm.

Apterous viviparous female. Antennæ longer than body; i. much larger than ii.; iii. a little longer than iv.; iv. and v. nearly equal, iv. if anything a little longer; base of vi. a little more than one-third of v.; flagellum not quite five times as long as base. Rostrum reaches to third coxæ. Cornicles cylindrical, expanding basally, a little longer than segment iv., about three-and-a-half times as long as cauda. Cauda with three hairs each side and one dorso-apical. Green; antennæ brown, base paler, iii. bright brown. Cauda and cornicles bright green. Legs greenish; tarsi dark; femora darkened.

Length 1.9 to 2 mm.

MYZUS CONTERMINUS Walker.

Aphis contermina Walker.

Zoologist, VII., App. XXXI. (1849).

Walker describes this Aphid as follows: "*The wingless viviparous female.* The body is small, oval, rather flat, pale brown, velvet-like, covered (especially beneath) with a white bloom, there are dark bands on the back, interrupted in the middle and ceasing towards the hind part of the body; the antennæ are black, brown at the base and about half the length of the body; the fourth joint is shorter than the third; the fifth joint is much shorter than the fourth; the sixth joint is much shorter than the fifth; the seventh joint is nearly as long as the fourth; the rostrum is pale yellow; its tip and the eyes are black; the tubes are dull yellow, with black tips and about one-eighth of the length of the body; the legs are dull yellow and rather short; the coxæ are brown; the knees, the tarsi and the tips of the tibiæ are black. Var.? The body is broad, dull, dark brown; the antennæ are black and more than half the length of the body; the rostrum is brown with a black tip; the legs are brown and rather long, knees, the tarsi and the tips of the tibiæ are black. On Sea Rocket (*Cakile maritima*)."

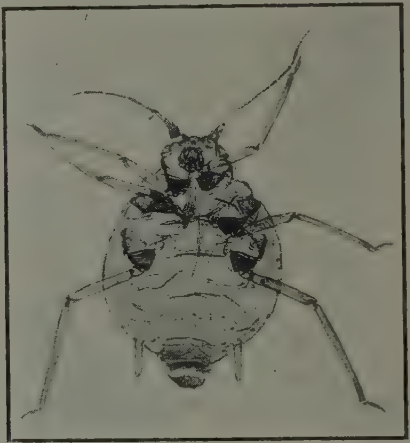

Fig. 195.—Oviparous ♀ of *Myzus conterminus* Wlk.

A slide in the British Museum, mounted by Mr. Laing, from the general collection with the name *contermina*, is that of an oviparous female. It is a *Myzus* and comes near *cerasi*, but the lateral lobes are not nearly so porrected as in the oviparous female of *cerasi*. The mounted specimen is somewhat globular in form; antennal segment i. is scaly; iii. longer than iv., on one side twice as long; about same length as vi.; on one side iv. and v. are about equal, in the other v. is a little shorter than iv.; base of vi. a little shorter than v.; flagellum one-and-a-half times as long as base. Rostrum rather short and thick, reaching to second coxæ. Cornicles cylindrical, shorter than segment iii., constricted at apices, imbricate. Coxæ dark. Hind tibiæ not much swollen, with about 58 scattered sensoria from near the base to close to the apex, irregular in outline, in many two joined together.

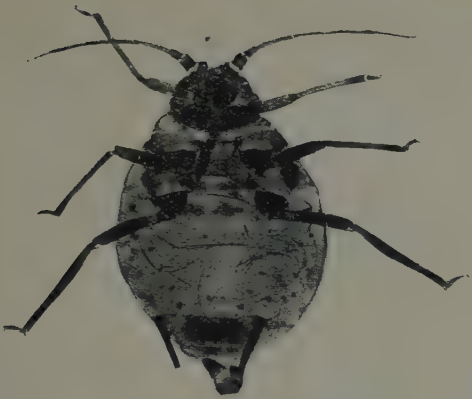

Fig. 196.—Oviparous ♀ of *Myzus cerasi* from Cherry.

The photograph is from the specimen mounted by Mr. F. Laing (Fig. 195).

I have compared it with the oviparous female of *cerasi* from the Cherry and it differs in the frontal lobes more than in anything else. It is here retained *pro tem* as a distinct species. It may be added here that in the oviparous female of *cerasi* the sensoria on the hind tibiæ although thickest on the basal half, pass well beyond it.

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